



Action for Mangrove Reforestation (ACTMANG) Japan and
Forest Resource Environment Development and
Conservation Association (FREDA) Myanmar



Evaluation Report on "Mangrove Ecosystems Restoration and Community Development Project"

Phase I to Phase V (from 1999~2023)

at Community Forests
in Pyindaye Reserved Forest, Pyapon Township, Myaungmya District,
Ayeyarwady Region, Myanmar.

2025 February



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Forest Resource Environment Development and Conservation Association.

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Disclaimer

This evaluation report has been prepared using data, information, and observations gathered as available from records and field observation at community forest plantations under the Mangrove Ecosystems Restoration and Community Development Project (Phase One to Phase Five) at the time of its development. While every effort has been made to ensure accuracy and reliability, the findings, conclusions, and recommendations are subject to the limitations of the data and methodologies used. The report reflects the independent opinions and professional judgment of the evaluation team. Due to budget constraints, a self-evaluation was conducted instead of a third-party independent evaluation. As such, the report may contain grammatical and technical errors, as well as inconsistencies in the use of evaluation terminology. The evaluation team acknowledges these limitations and kindly requests readers' understanding regarding the challenges related to English proficiency, evaluation experience, and financial resources. As the saying goes, 'Even the best can be improved.' The Central Committee and Executive Committee members of FREDa have made significant contributions to enhancing this report; however, further improvements may still be needed to reach its full potential. The evaluation team humbly requests your kind corrections and recommendations. We sincerely welcome your feedback, and any errors identified will be addressed in a revised publication, subject to available funding."



Abbreviation

ACP	Andaman Capital Partner
ACTMANG	Action for Mangrove Reforestation Japan
CF	Community Forest
CFE	Community Forestry Enterprise
CFI	Community Forestry Instruction
CFUG	Community Forest User Group
DALMS	Department of Agricultural Land Management and Statistics
DKH	Diakonie Katastrophen hilfe of Germany
DOA	Department of Agriculture
DOF	Department of Fishery
EED	Evangelischer Entwicklungsdients of Germany
FREDA	Forest Resource Environment Development and Conservation Association
FD	Forest Department
GAD	General Administration Department
GEDA	Green Environment Development Association
FAO	Food and Agriculture Organization of the United Nations
MERN	Myanmar Environmental Rehabilitation Network
RECOFTC	Regional Community Forestry Training Centre
UNDP	United Nations Development Programme

Summary

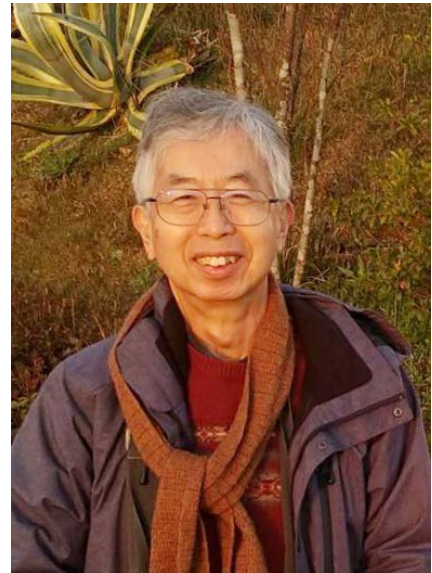
The evaluation on the Mangrove Ecosystems Restoration and Community Development Project from Phase I to Phase V in Pyindaye Reserved Forest highlights the project's successful efforts to restore degraded mangrove areas through planting key species such as *Rhizophora*, *Avicennia*, and *Bruguiera*. Despite challenges like illegal logging and land conversion, the project has increased forest cover and biodiversity, positively impacting local communities and ecosystems. Stakeholder feedback and data analysis showed improvements in mangrove health, CO₂ sequestration, and community engagement. The report recommends strengthening community-based management, securing additional funding, and enhancing technical capacity to ensure the project's sustainability and effectiveness in future phases. Overall, the project has met its goals and provided valuable lessons for continued reforestation efforts.



Preamble

This is an evaluation report of 25 years FREDa/ACTMANG Project in Pyindaye Reserved Forest, Pyapon Township, Ayeyarwady Region, Myanmar. The mangrove ecosystems restoration and community development project started in 1999, and Phase V was completed in 2023. Phase VI (2024-2028) of the Project is now ongoing in Laputta Township for another 5 years. As the Project coordinating counterpart, we at ACTMANG are pleased to receive this evaluation report at the right time, thanks to the dedicated efforts of the FREDa evaluation team, who must have worked hard to complete this challenging mission. In a humble, honest and comprehensive manner, this report is made self-evaluated by Project executing party of FREDa. Certainly, this will present the useful and valuable information/recommendations to all the stakeholders for reviewing and improving the shortcomings of the Project.

Our long-term Project in Pyindaye was epoch-making, and will be never forgotten by the local villagers especially who devoted and played an important role for restoring the mangrove ecosystems with pride. So far, many local/international actors of NGOs have involved in mangrove reforestation and community development in Pyindaye concerned. FREDa/ACTMANG is just one of them. We had carried out over 3,000ha of mangrove planting with huge amounts of money input. Tokio Marine & Nichido Fire Insurance Company Limited is the funding agency of the Project since the beginning. We cannot forget their generous and continued financial support. Tokio Marine has been conducting mangrove planting projects in 9 countries: namely Myanmar, Vietnam, the Philippines, Thailand, Malaysia, Fiji, Indonesia, India and Bangladesh. Tokio Marine appointed 3 Japan-based international NGOs (ISME, OISCA and ACTMANG) for execution of the projects, and 2 countries of Myanmar and Vietnam were selected by ACTMANG. Tokio Marine projects are so-called “The Green Insurance for our Planet Earth”. The company insists on continuing the projects for 100 years till end of 21st century as a Corporate Social Responsibility.



Mr. Kogo, the founder and ex-chairman of ACTMANG, set the basis of our mutual collaboration with FD and FREDa in the beginning of the Project with his old good friends, U OHN, Dr. Maung Maung Than, U Win Maung and others. The late Saya Gyi U OHN left behind these important words: “Saving the trees is much better than planting.” In October 2024, we erected a stone monument next to a sacred old Kambala (*Sonneratia apetala*) at Oak Po Kwin Chaung, Pyindaye, to commemorate U OHN’s great work. We will never forget him.

I personally remember a wise remark by U Kyaw Kyaw Tun, FREDa field assistant. He said, “If I love mangroves, mangroves will love me back”. Buddhism philosophy of *Ahhmya and Kutho* can teach us the importance of merit-giving not only for human beings but also for all animate beings including Nats, the spiritual ones. Hope this wisdom shall not vanish.

In memories of late chairman of FREDa, U Sann Lwin, our mentor of mangrove...

SUDA Seiji
Representative, ACTMANG

Preamble



I am truly delighted to write a brief note to this evaluation report on behalf of the FRED A (FRED A). This evaluation report is a milestone of long-term mangrove restoration project jointly implemented by the ACTMANG and the FRED A in Ayeyarwaddy mangrove forests which is home for at about 6 million peoples. Our collaboration on mangrove forests restoration emphasizes the unlimited ecological, economic, and social dimensions of mangrove forests; the three main pillars for the sustainable development of present and future generations. The main aim of the evaluation is to access whether the reforestation goal are met to assess the relevancy, effectiveness, efficiency and sustainability of the reforestation efforts done so far. The SWOT analysis is employed to analyze strengths, weakness, opportunity and threats in our works of reforestation and this is followed by recommendations for future reforestation activities.

A total of more than 3,000 hectares of mangrove forests has been restored through planting of mangrove species under the joint collaboration of the both parties in the last 25 years (1999-2024). The whole huge expense for these 25 year-long mangrove reforestations, at about 1.2 million USD, was entirely from Tokio Marine & Nichido Fire Insurance Company Limited through the ACTMANG, Tokyo, Japan. Mr. Motohiko KOGO, the founder and Ex-Chairman of ACTMANG, and Sayargyi U Ohn, one of the founders of the FRED A, do deserve our sincere appreciation for their far-sighted thinking for the two parties' collaboration for this mangrove forest restoration. The ACTMANG's technical supports together with the FRED A staff' dedicated efforts on mangrove reforestation for the last successive 25 years have demonstrated a significant commitment to the restoration of these critical ecosystems which play a vital role in coastal protection, biodiversity conservation, climate change mitigation, and livelihood support. While the initiative has achieved notable successes, it also encountered some challenges, underscoring the complexity of mangrove restoration efforts.

The report highlights key lessons learned, including the importance of diversifying mangrove species to enhance ecosystem resilience and the need to avoid over-reliance on a single species. It is unfortunate for non-local readers to this report as questionnaires are mentioned in local language. The initiation of eco-friendly mangrove aquaculture to raise as mid-term income for the farmers should be done, and such an act will enable the sustainability of reforested mangrove forests we have accomplished.

Through this evaluation, we aim to provide a comprehensive assessment of the project's outcomes, identify areas for improvement, and offer recommendations to guide future mangrove restoration efforts. By doing so, we hope to contribute to the sustainable management and conservation of mangrove forests, ensuring their continued benefits for both people and the planet.

San Win (PhD)

Chairman,

FREDA

February 2025

Evaluation on “Mangrove Ecosystems Restoration and Community Development Project”
Phase I to Phase V at Community Forests in Pyindaye Reserved Forest, Pyapon Township,
Pyapon District, Ayeyarwady Region, Myanmar.

1. Introduction

1.1 Background history of Pyindaye reserved forest:

The southern part of the Pyindaye Reserved Forest, located in Pyarpon Township, comprises 43 compartments, spanning from Compartment 24 to Compartment 66. Originally, the reserved forest covered 111,432 acres of land and included a 9,530-acre water body. Currently, 89,485.59 acres of land remain as reserved forest, following the de-reservation of 21,946.41 acres. However, the 9,530-acre water body remains unchanged. Thus, the present reserved forest area, including the water body, totals 99,015.59 acres.

1.2 Landuse in southern part of Pyindaye reserved forest.

According to the land use data for the southern part of the Pyindaye Reserved Forest, as shown in Table 1.1, rice fields account for 64% of the area. The remaining 34% comprises mangrove plantations, privately owned plantations, village fuelwood plantations, community forests, privately owned perennial plantations, good natural forest, and degraded forest. The Forest Department has allocated 6,043 hectares (14,932 acres) as community forest to 45 Community Forest User Groups within the Pyindaye Reserved Forest.

Table 1.1 Land use of Southern part of the Pyindaye reserved forest

Sr	Land use	Area(acre)	Area(Ha)	%
1	Mangrove Plantation	2637.5	1067	2.7
2	Private owned hardwood plantation	945	382	1
3	Village fuelwood plantation	3150	1275	3.2
4	Community Forest	14857	6013	15
5	Private owned perennial plantation	6178.3	2500	6.2
6	Good Natural Forest	4816.5	1949	4.9

7	Degraded forest	1540	623	1.6
8	Recorded rice field	12346	4996	12.5
9	Village residential area	20.394	8	0
10	Ricefield (unrecorded)	51376	20791	51.9
11	Religious land(unrecorded)	46	19	0
12	Other land use such as Dani	493	200	0.5
13	Other land use such as solar salt production	588.35	238	0.6
14	Other land use such as department	21	8	0
	Total	99016	40070	

1.3 Threat and Issues found in Pyindaye reserved Forest

Identified Threats and Issues in Pyindaye Reserved Forest were;

1. Fuelwood Harvesting for Urban and Industrial Needs
Mangroves are cut to meet the fuelwood and charcoal demands of major cities and industries, such as dry shrimp production, and for crafting fishing tools like “tiger mouth nets.”
2. Charcoal Extraction
Reliance on mangroves for charcoal production, exacerbated by electricity shortages in cities, has historically contributed to resource depletion. Charcoal exports and industrial dependence on fuelwood further accelerate deforestation.
3. Land Use Change for Rice Cultivation
The conversion of mangrove forests into paddy fields reduces mangrove cover, weakening coastal defenses and disrupting fisheries.
4. Abandoned Rice Fields
Poor soil quality and salinity issues have left many rice fields abandoned. These areas offer potential for mangrove restoration, though careful management is essential.
5. Land Use Change for Salt Production
Mangrove forests are being replaced by salt production operations, further degrading the ecosystem.
6. Plastic Pollution
Reforestation efforts contribute to plastic pollution, impacting the health of restored mangrove ecosystems in streams, rivers, and seas. This issue arises mainly from

discarded seedling containers left behind in reforestation areas. Moreover, fishing net pollution, particularly from ghost nets (abandoned, lost, or discarded fishing gear), is a significant environmental threat to marine and coastal ecosystems, including mangroves, coral reefs, and estuaries.

7. **Pest Infestations**
Leaf defoliator insects pose a threat to mangroves species like *Avicennia officinalis* (Thame Gyi), reducing their vitality and growth.
8. **Predation by Ghost Crabs (*Ocypode* spp.)**
Ghost crabs damage young mangrove seedlings of *Avicennia officinalis* (Thame Gyi), hindering successful restoration and regeneration.
9. **Overlapping Resource Use**
Competing demands from industries, agriculture, and local communities create resource conflicts that strain mangrove ecosystems.
10. **Environmental Degradation**
The conversion of mangroves to alternative uses reduces their ability to provide coastal protection, support biodiversity, and sequester carbon.
11. **Lack of Sustainable Alternatives**
Limited adoption of eco-friendly practices in agriculture, aquaculture, and salt production intensifies environmental impacts and resource depletion.
12. **Weak Enforcement and Governance**
Insufficient regulations and enforcement allow illegal logging and unsustainable resource exploitation to persist.
13. **Social and Economic Pressures**
Local communities heavily rely on mangrove ecosystems for their livelihoods, creating significant social and economic pressures on these forests.

1.4 Goal and objectives of Mangrove Ecosystems Restoration and Community Development Project

Addressing the identified threats requires comprehensive and integrated strategies, such as sustainable land-use planning, community-based conservation, stricter enforcement of environmental regulations, and the promotion of eco-friendly practices. FREDA and ACTMANG have set the following goal and objectives for the Mangrove Ecosystems Restoration and Community Development Project:

Goal

To restore, conserve, and sustainably manage the mangrove ecosystems of Pyindaye Reserved Forest through active collaboration with local communities, with the aim of mitigating climate change, increasing forest cover, conserving biodiversity, preventing stream and river bank erosion, and improving the livelihoods of Community Forest User Groups (CFUGs).

Objectives

1. Restore Degraded Mangrove Areas:

Rehabilitate degraded area of community forests within Pyindaye Reserved Forest by planting suitable mangrove species across the community forests.

2. Promote Community Involvement:

Engage Community Forest User Groups (CFUGs) actively in the reforestation efforts within their designated community forests.

1.5 Location of the project sites.

With the participation of the community forest user groups, FREDA Myanmar and ACTMANG Japan had implemented Mangrove Ecosystems Restoration and Community Development Project phases I to V, in Pyindaye Reserved Forest, Pyapon Township, Pyapon District, Ayeyarwaddy Region, Myanmar, from 1999 to 2023. Location of project sites are shown in Attachment 1. FREDA selected (5670) ha (13959) acre of community forest from (28) villages for Mangrove Ecosystems Restoration and Community Development Project site. More than three thousand fifty hectare (7534 acres) of mangrove plantations including regeneration improvement felling were established from Phase I to Phase V (from 1999~2023) at (5670) ha(13959) acre of community forest from (28) villages Pyindaye Reserved Forest, Pyapon Township, Pyapon District, Ayeyarwady Region, Myanmar.

1.6 Major species planted

Major species planted were *Bruguiera* (Byu), *Sonneratia apetala* (Kanbala), *Avicennia officinalis*(Thame Gyi), *Avicennia marina* (Thame Phyu), *Xylocarpus moluccensis* (Kyana), *Aegialitis rotundifolia* (Sarthar), *Lumnitzera racemose* (Aeik ma thwe), *Heritiera fomes* (Kanazo), *Ceriops decandra* (Madama) etc. [3]

2. Objective of the Evaluation on Mangrove Ecosystems Restoration and Community Development Project

FREDA Myanmar and ACTMANG Japan will continue Mangrove Ecosystems Restoration and Community Development Project Phase VI, in Ayeyarwaddy region, Latputta township from 2024 to 2028. 500 ha of mangrove plantation will be established at the community forest, with the participation of community forest user groups from 22 villages in Latputta township, Ayeyarwaddy region. FREDA need to develop strategies to enhance its effectiveness and sustainability in future phases.

In the 5/2024 Central Committee meeting of FREDA, which was held on 5th April, 2024, FREDA decided to evaluate on Mangrove Ecosystems Restoration and Community Development Project phases I to V. FREDA formed evaluation team, consisting executive committee members, project manager of Mangrove Ecosystems Restoration and Community Development Project, on 29th April, 2024 with the office order number 307. Evaluation team collected baseline information, data, maps, reference, literature since 29th April, 2024.

In the 8/2024 Central Committee meeting, members recommended to apply third-party evaluation. According to financial constraint, self-evaluation was selected to focus on self-reflection and identifying personal or organizational areas for improvement.

The objective of the evaluation on the Mangrove Ecosystems Restoration and Community Development Project Phase I to Phase V are;

1. To assess the relevancy, effectiveness, efficiency, and sustainability of the reforestation effort from Mangrove Ecosystems Restoration and Community Development Project phase one to phase five.
2. To analyze strengths, weakness, opportunity and threats
3. To collect feedback from stakeholders
4. To determine whether project goals are being met.
5. To develop recommendations for future Mangrove Ecosystems Restoration and Community Development Project Phase VI

3. Methodology used in evaluation

The following methods were used in accordance with the available budget, weather condition in delta area, available time to do evaluation, available human resources, etc.

3.1 Stakeholder Identification and stakeholder analysis

3.2 Evaluate Relevancy, Effectiveness, Efficiency and Sustainability.

3.3 Assess “Inputs, Output, Outcomes, Most Significant Changes and Impacts of the Mangrove Ecosystems Restoration and Community Development Project”

3.4 The ‘river of life’ story telling technique

The ‘river of life’ story telling technique will be used to encourage community forest user group members to think about Mangrove Ecosystems Restoration and Community Development Projects implemented at their community forest area in terms of a flowing, connected process with ‘critical moments’ such as hitches, successes, failures or unexpected events that may lead to a change in course, stagnation or growth.

3.5 Literature review for the Evaluation on Mangrove Ecosystems Restoration and Community Development Project

In conducting the evaluation and SWOT analysis, the evaluation team made every effort to adhere to the following guidelines, procedures, recommendations and methods outlined in relevant literature. However, due to limitations such as time and budget constraints, certain guidelines, procedures, and methods may not have been fully implemented.

The evaluation team reviewed literature concerning with relevancy, effectiveness, efficiency, sustainability, strengths, weakness, opportunity, threats of the project activities.

1. The Relevancy, Effectiveness, Efficiency, and Sustainability of the Mangrove Ecosystems Restoration and Community Development Project

The following activities should be done to assess the relevancy, effectiveness, efficiency, and sustainability of the reforestation effort from Mangrove Ecosystems Restoration and Community Development Project phase one to phase five, in accordance with the available budget, weather condition in delta area, available time to do evaluation, available human resources, etc.

1. Conduct ecological surveys such as change in mangrove forest coverage, mangrove species diversity, mangrove ecosystem health over time by using field survey, remote sensing techniques, aerial or satellite imagery analysis.
2. Measure growth rates of planted mangrove saplings.
3. Assess survival rates over time by using on-site inspections and data collection.
4. Evaluate changes in biodiversity within the restored community forest area.
5. Assess changes in water quality parameters such as salinity, pH, dissolved oxygen, and nutrient levels within the restored mangrove habitats.
6. Observe the disposal of plastic waste after transplanting seedling at community forest.
7. Conduct community engagement survey in mangrove reforestation and management of restored area in community forest, collect the feedback from local communities, assess their perceptions of the project's impact, assess their level of involvement and support in mangrove reforestation and management of restored area in community forest by holding interviews, focus groups, or surveys.
8. Evaluate the socio-economic benefits of the reforestation project for local communities, such as livelihood opportunities, job opportunity, and coastal protection. Evaluate the project's overall impact on human well-being.
9. Assess the effectiveness of partnerships and collaborations with government agencies (such as Forest Department, Department of Agriculture, Department of Fishery, Department of Agricultural Land Management and Statistics (DALMS), General Administration Department), NGOs (Such as FREDa, ECCDI, MERN, RECOFTC, Green Environment Development Association -GEDA), and other stakeholders (such as UNDP, FAO, Andaman Capital Partner- ACP, Action for Mangrove Reforestation - ACTMANG) in achieving project goals. This involves evaluating the extent of cooperation, resource sharing, and coordination among partners.

10. Conduct a cost-benefit analysis to assess the economic efficiency of the reforestation efforts, taking into account both the costs of implementation and the benefits accrued in terms of ecosystem services and socio-economic gains.

2. Strengths, weakness, opportunity and threats

This evaluation aims to identify and analyze what aspects of the project have been successful and what areas may require improvement, such as project management, stakeholder engagement, or ecological outcomes. Identifying strengths, weaknesses, opportunities, and threats (SWOT analysis) is crucial for evaluating the effectiveness and sustainability of a Mangrove Ecosystems Restoration and Community Development Project. SWOT analysis will be conducted in accordance with the available budget, weather condition in delta area, available time to do evaluation, available human resources, etc.

Strengths:

1. **Species Diversity:** There are diverse species in the mangrove area, which contribute to ecosystem resilience and biodiversity.
2. **Carbon Sequestration:** Highlight the role of mangroves in sequestering carbon dioxide and mitigating climate change.
3. **Coastal Protection:** Recognize the ability of mangroves to act as natural buffers against coastal erosion, storm surges, and tsunamis.
4. **Community Engagement:** Emphasize the involvement of local communities in project planning, implementation, and monitoring, fostering ownership and long-term stewardship.
5. **Stakeholder Partnerships:** Highlight partnerships with government agencies, NGOs, research institutions, and other stakeholders, leveraging resources and expertise for project success.

Weaknesses:

1. **Site Selection Challenges:** Acknowledge constraints such as limited suitable sites for reforestation, land tenure issues, or conflicting land uses.
2. **Seedling Survival Rates:** Assess potential challenges related to low seedling survival rates due to predation, competition, or inadequate site preparation.
3. **Funding Constraints:** Recognize the financial limitations and uncertainties associated with securing adequate funding for project activities and long-term maintenance.
4. **Technical Capacity:** Evaluate the availability of technical expertise and resources for implementing reforestation techniques effectively.

5. **Monitoring and Evaluation:** Identify weaknesses in monitoring and evaluation systems, including limited data availability or capacity for tracking project outcomes and impacts.

Opportunities:

1. **Policy Support:** Capitalize on favorable policy frameworks and incentives for mangrove conservation and restoration, including international agreements, national laws, and local regulations.
2. **Funding Opportunities:** Explore potential funding sources such as grants, donations, corporate partnerships, and carbon offset schemes to support project activities.
3. **Community Benefits:** Identify opportunities to enhance livelihoods and well-being for local communities through eco-tourism, sustainable harvesting, or alternative income-generating activities linked to mangrove restoration.
4. **Research and Innovation:** Embrace opportunities for collaboration with researchers and innovators to develop and apply new technologies, methodologies, and best practices for mangrove reforestation.
5. **Education and Awareness:** Utilize opportunities to raise awareness and build capacity among stakeholders, including educational programs, workshops, and outreach campaigns.

Threats:

1. **Climate Change Impacts:** Consider threats posed by climate change, including sea-level rise, extreme weather events, and changes in temperature and precipitation patterns, which can affect mangrove survival and distribution.
2. **Pollution and Degradation:** Address threats from pollution, habitat degradation, illegal logging, aquaculture expansion, and other human activities that degrade mangrove ecosystems.
3. **Invasive Species:** Recognize the threat of invasive species that compete with native mangroves for resources and disrupt ecosystem functions. Invasion of a mangrove ecosystem by non-native species can disrupt its balance and functioning and change its biodiversity. Biological invasions of non-mangrove or mangrove species can directly and indirectly influence these ecosystems. Preventing invasions of plant species in mangroves implies overcoming multiple challenges. These include the intertidal environment in which mangroves are found, the lack of competitors for the invasive species, their effective dispersal mechanism, and limited accessibility for physical removal. Additionally, the lack of funding and awareness about invasions in

mangroves further complicates the process. Therefore, managing invasive species is a crucial step.

4. **Land Conversion:** Assess risks associated with land conversion for development projects, agriculture, aquaculture, or infrastructure, which may lead to habitat loss and fragmentation.
5. **Socioeconomic Pressures:** Consider socioeconomic pressures such as population growth, urbanization, poverty, and unsustainable resource use, which can exacerbate threats to mangrove ecosystems.

By conducting a comprehensive SWOT analysis, we can identify key factors influencing the success and sustainability of a Mangrove Ecosystems Restoration and Community Development Project and develop strategies to maximize strengths, address weaknesses, capitalize on opportunities, and mitigate threats.

Identifying the strengths and weaknesses of the Mangrove Ecosystems Restoration and Community Development Project involves a thorough assessment of various aspects of the project's implementation, outcomes, and impact. In accordance with the available budget, weather condition in delta area, available time to do evaluation, available human resources, we will do the following steps.

Review Project Documentation: Gather all available documentation related to the project, including project proposals, reports, monitoring data, and stakeholder feedback. Reviewing these documents can provide insights into the project's objectives, strategies, activities, and achievements.

Stakeholder Consultation: Engage with stakeholders involved in the project, including local communities, government agencies, NGOs, scientists, and project implementers. Conduct interviews, focus group discussions, or surveys to gather their perspectives on the project's strengths and weaknesses.

3. Collecting feedback from stakeholders

Feedback from stakeholders will be collected in accordance with the available budget, weather condition in delta area, available time to do evaluation, available human resources, etc. Collecting feedback from stakeholders is crucial for understanding their perspectives, needs, and concerns regarding the Mangrove Ecosystems Restoration and Community Development Project. Here are several methods to collect feedback effectively:

Surveys: Develop and distribute surveys to stakeholders, including local communities, government agencies, NGOs, scientists, and project implementers. Surveys can be conducted in person, through email, or using online survey platforms. Ensure that the survey questions are clear, concise, and cover relevant aspects of the project.

Interviews: Conduct individual or group interviews with key stakeholders to gather in-depth insights into their experiences, opinions, and suggestions regarding the project. Use open-ended questions to encourage stakeholders to express their views freely. Interviews can be conducted face-to-face, over the phone, or via video conferencing.

Focus Group Discussions: Organize focus group discussions with representatives from different stakeholder groups to facilitate interactive discussions on specific topics related to the project. Focus groups allow stakeholders to share their perspectives, exchange ideas, and identify common concerns or priorities.

Community Meetings: Host community meetings or workshops in project-affected areas to engage directly with local communities. Provide opportunities for community members to voice their feedback, ask questions, and participate in decision-making processes related to the project. Use local languages and culturally appropriate communication methods to ensure inclusivity and accessibility.

Feedback Forms: Distribute feedback forms or comment cards at project events, workshops, or public gatherings. Encourage stakeholders to provide written feedback on their experiences with the project, suggestions for improvement, or concerns they may have.

Online Platforms: Create online platforms, such as project websites, social media pages, or dedicated forums, where stakeholders can submit feedback, ask questions, and engage in discussions related to the project. Monitor these platforms regularly and respond promptly to stakeholder inquiries and comments.

Participatory Mapping: Use participatory mapping techniques to engage stakeholders in mapping out key project areas, resources, and concerns. This approach can help identify local knowledge and priorities, as well as potential conflicts or opportunities for collaboration.

Key Informant Interviews: Identify key informants within stakeholder groups who possess valuable insights or expertise relevant to the project. Conduct interviews with these individuals to gather nuanced perspectives and recommendations for project improvement.

Anonymous Feedback Channels: Establish anonymous feedback channels, such as suggestion boxes or online forms, for stakeholders who may be hesitant to share their feedback openly. This can encourage candid responses and help address sensitive issues or concerns.

By employing a combination of these methods, we can effectively collect feedback from stakeholders, ensure their meaningful participation in the project, and use their insights to inform decision-making and improve project outcomes.

4. Analyzing data and monitor results (Changes in mangrove health, biodiversity, ecosystem services over time)

Evaluation team will analyze data and monitor results (Changes in mangrove health, biodiversity, ecosystem services over time) in accordance with the available budget, weather condition in delta area, available time to do evaluation, available human resources, etc. Analyzing data and monitoring results related to changes in mangrove health, biodiversity, and ecosystem services over time involves several steps:

Data Collection: Collect relevant data on mangrove health, biodiversity, and ecosystem services using various methods, such as field surveys, remote sensing, and ecological monitoring. This data may include measurements of mangrove density, species composition, water quality parameters, and indicators of ecosystem function.

Establish Baselines: Establish baseline data for key indicators of mangrove health, biodiversity, and ecosystem services prior to the initiation of the reforestation project. This baseline data will serve as a reference point for assessing changes over time and evaluating the effectiveness of the project.

Long-term Monitoring: Implement a long-term monitoring program to track changes in mangrove ecosystems at regular intervals (e.g., annually or biennially) throughout the duration of the reforestation project. This may involve repeated field surveys, satellite imagery analysis, and continuous monitoring of water quality parameters.

Quantitative Analysis: Use quantitative analysis techniques to analyze the collected data and identify trends, patterns, and correlations related to mangrove health, biodiversity, and ecosystem services over time. This may include statistical analysis, spatial analysis, and modeling approaches to assess changes in ecosystem structure and function.

Comparison with Control Sites: Establish control sites or reference areas outside of the project area to compare changes in mangrove ecosystems over time. This can help differentiate the effects of the reforestation project from natural variability or external factors influencing mangrove dynamics.

Indicator Species Monitoring: Monitor populations of indicator species, such as mangrove-dependent birds, fish, and invertebrates, to assess changes in biodiversity within the restored mangrove habitats. Indicator species can serve as proxies for overall ecosystem health and resilience.

Remote Sensing Analysis: Utilize remote sensing technologies, such as satellite imagery and aerial photography, to track changes in mangrove extent, structure, and health over time. Remote sensing data can provide valuable information on large-scale trends and spatial patterns of mangrove dynamics.

Integration of Socio-economic Data: Integrate socio-economic data into the monitoring and analysis process to assess the impacts of mangrove reforestation on local communities and livelihoods. This may include surveys of community perceptions, economic valuation studies, and assessments of ecosystem service benefits derived from mangrove ecosystems.

Adaptive Management: Use the findings from data analysis and monitoring to inform adaptive management decisions and adjust project strategies as needed. Identify areas where additional intervention may be necessary to address emerging threats or optimize project outcomes.

By systematically analyzing data and monitoring results over time, project managers can track the progress of mangrove reforestation efforts, identify emerging trends or challenges, and make informed decisions to enhance the effectiveness and sustainability of the project.

5. Determination whether project goals are being met

Determining whether project goals are being met involves a systematic process of monitoring, evaluation, and assessment. We will do the following steps to determine if project goals are being achieved, in accordance with the available budget, weather condition in delta area, available time to do evaluation, available human resources, etc.

Establish Clear and Measurable Goals: Ensure that project goals are specific, measurable, achievable, relevant, and time-bound (SMART). Clearly define the desired outcomes and targets that the project aims to achieve within a specified timeframe.

Develop Key Performance Indicators (KPIs): Identify key performance indicators (KPIs) that align with each project goal and provide quantitative or qualitative measures of progress. KPIs should be meaningful, relevant, and actionable, allowing project managers to track performance effectively.

Baseline Assessment: Conduct a baseline assessment to establish the starting point or initial conditions related to each project goal. This involves collecting baseline data or conducting surveys to measure the current status of relevant indicators before implementing project interventions.

Regular Monitoring and Data Collection: Implement a monitoring and data collection system to track progress toward achieving project goals over time. Collect data on key indicators at regular intervals using appropriate methods and tools, such as surveys, interviews, field measurements, or remote sensing technologies.

Compare Actual Progress with Targets: Periodically compare actual progress against the targets or benchmarks set for each project goal. Analyze the collected data and assess whether the project is on track to meet its objectives within the specified timeframe.

Assess Trends and Patterns: Analyze trends, patterns, and correlations in the collected data to identify emerging patterns or trends related to project performance. Determine whether progress is consistent, accelerating, or lagging behind expectations.

Evaluate Success Criteria: Evaluate whether the project is achieving its intended outcomes and whether these outcomes contribute to the overall success of the project. Consider the qualitative and quantitative aspects of success criteria, including ecological, social, economic, and institutional dimensions.

Engage Stakeholders: Seek feedback from stakeholders, including project beneficiaries, partners, and community members, to assess their perceptions of progress and whether project goals are being met from their perspective. Incorporate stakeholder input into the evaluation process.

Iterative Adjustment: Use the findings from monitoring and evaluation activities to inform adaptive management decisions and make adjustments to project strategies, activities, or implementation approaches as needed. Continuously refine project plans and interventions based on lessons learned and emerging challenges.

Documentation and Reporting: Document monitoring and evaluation findings, including progress reports, data analysis results, and lessons learned. Prepare periodic reports to communicate project progress, achievements, and challenges to stakeholders, funders, and other relevant parties.

By following these steps, project managers can systematically assess whether project goals are being met, identify areas for improvement, and take corrective actions to enhance project performance and effectiveness.

6. Developing recommendations for future Mangrove Ecosystems Restoration and Community Development Project Phase VI

Developing recommendations for future Mangrove Reforestation Phase VI involves a comprehensive analysis of past project phases, stakeholder feedback, and emerging challenges or opportunities. We will use an approach to develop recommendations: in accordance with the available budget, weather condition in delta area, available time to do evaluation, available human resources, available documents from the past 25 years, etc.

Review Previous Phases: Conduct a thorough review of the outcomes, successes, challenges, and lessons learned from previous phases of the Mangrove Ecosystems Restoration and Community Development Project. Identify what worked well and areas that require improvement.

Assess Stakeholder Feedback: Gather feedback from key stakeholders, including local communities, government agencies, NGOs, scientists, and project partners, regarding their

experiences with the project. Consider their perspectives, suggestions, and concerns when formulating recommendations.

Identify Emerging Trends and Challenges: Identify emerging trends, challenges, and opportunities related to mangrove conservation, climate change, socio-economic dynamics, and policy frameworks. Consider how these factors may influence the design and implementation of next Phase VI.

Set Clear Objectives: Define clear and achievable objectives for Phase VI of the reforestation project based on the identified needs, goals, and priorities. Ensure that objectives are aligned with broader conservation objectives, sustainable development goals, and stakeholder expectations.

Incorporate Best Practices: Incorporate best practices and lessons learned from other Mangrove Ecosystems Restoration and Community Development Projects, scientific research, and international guidelines into the design and implementation of Phase VI. Learn from successful approaches and adapt them to the local context.

Integrate Adaptive Management: Integrate adaptive management principles into Phase VI, allowing for flexibility, learning, and adjustment based on monitoring and evaluation findings. Develop mechanisms for ongoing feedback, learning, and continuous improvement throughout the project cycle.

Enhance Community Engagement: Strengthen community engagement and participation in Phase VI by involving local communities in decision-making, planning, implementation, and monitoring activities. Empower communities to take ownership of the reforestation efforts and ensure their active involvement throughout the project.

Promote Multi-Stakeholder Collaboration: Foster collaboration and partnerships among government agencies, NGOs, research institutions, private sector actors, and local communities to leverage resources, expertise, and networks for the success of next phase. Build on existing partnerships and forge new collaborations where necessary.

Integrate Climate Resilience: Integrate climate resilience considerations into Phase VI by selecting resilient mangrove species, enhancing ecosystem-based adaptation measures, and incorporating climate change projections into project planning and design.

Ensure Long-term Sustainability: Develop strategies to ensure the long-term sustainability of mangrove reforestation efforts beyond Phase VI, including capacity building, institutional strengthening, sustainable financing mechanisms, and policy support.

Monitor and Evaluate Progress: Establish a robust monitoring and evaluation framework for Phase VI to track progress, measure outcomes, and assess the effectiveness of interventions. Use monitoring data to inform adaptive management, decisions and adjust strategies as

needed.

Communicate and Disseminate Results: Communicate project recommendations, objectives, and outcomes to stakeholders, funders, policymakers, and the broader public through various communication channels. Share success stories, lessons learned, and best practices to inspire and mobilize support for mangrove conservation efforts.

By following these steps, FREDa can develop informed and actionable recommendations for Phase VI of the Mangrove Ecosystems Restoration and Community Development Project, ensuring its effectiveness, sustainability, and positive impact on mangrove ecosystems and local communities.



4. Stakeholder Identification and analysis

4.1 List of stakeholders

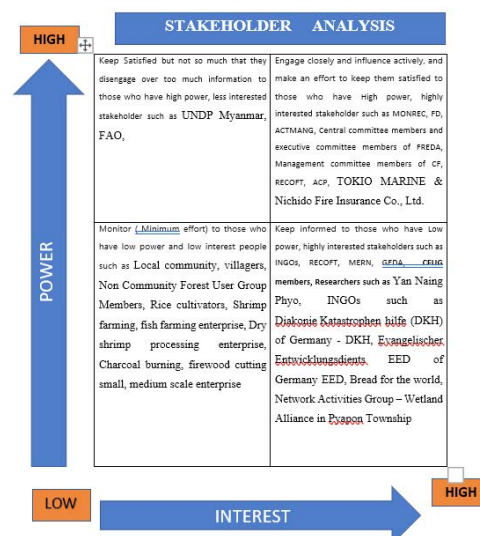
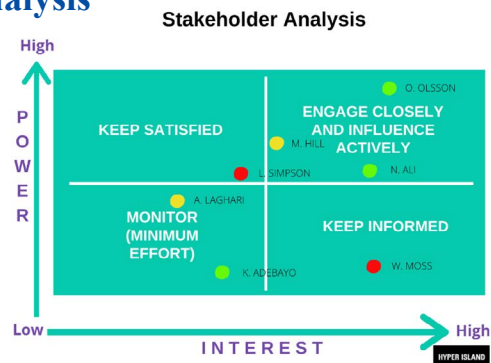
1. Ministry of Natural Resource and Environmental Conservation- MONREC support to get agreement from Ministry of Home Affairs, Union Registration Committee in issuing registration certificate to carry out the activities of FREDa.
2. Ayeyarwaddy region government give agreement to implement the Mangrove Ecosystems Restoration and Community Development Project in Ayeyarwaddy region.
3. Forest Department, Director General Office gave agreement to implement the Mangrove Ecosystems Restoration and Community Development Project in Ayeyarwaddy region, with the cooperation of ACTMANG and FREDa.
4. Forest Department (Pyapon township FD, Labutta township FD, Myaungmya District FD, Ayeyarwaddy region FD) gave agreement and permission to restore the mangrove forest at community forest area which require restoration.
5. TOKIO MARINE & Nichido Fire Insurance Co., Ltd. give financial support to ACTMANG.
6. Action for Mangrove- ACTMANG give financial and technical support for the project.
7. FREDa is responsible or accountable for the project implementation.
8. ECCDI collect field data in the designated community forests in Pyapon Township in Ayeyarwaddy Delta to conduct carbon accounting and estimation of carbon sequestration in (21) Mangrove CF, and collect soil sample to analyse Soil Carbon Content.
9. CFUG from Pyindaye reserved forest engage in Mangrove Ecosystems Restoration and Community Development Project, and maintenance of the mangrove forest plantation, which were established by project in their community forest area.
10. Management Committee members of community forest collaborate with the Mangrove

Ecosystems Restoration and Community Development Project implementation team.

11. MERN give technical support for the development of Community Forest Enterprise-CFE, mud crab breeding to control ghost crab which destroy fruit and young seedling of mangrove species.
12. RECOFTC for Asia and the Pacific give technical support for the development of Community Forest, such as Participatory Monitoring, Evaluation and Learning-PMEL.
13. ACP, support for replanting of 300 acre of mangrove seedlings at three community forest in 2023 and 450,000 mangrove seedlings on 500 acres land within eight Community Forests in Pyindaye Reserved Forest in 2024.
14. UNDP Myanmar can support the Mangrove reforestation technique and mangrove reforestation research to address the issues after 1970's, mangroves were cut down indiscriminately and ever dense forests were devastated due to increased demand of fuel woods/charcoals after the Oil Crisis.
15. UN-Habitat Myanmar MCCA Team undertake the activity on "Implementing ecovillage principles in the six villages in Pyarpon and two villages in Bogalay township, Ayeyarwady region" under EU funded project "Myanmar Climate Change Alliance (MCCA)" to scale up the capacity building of local communities' forest user to adapt and mitigate the impact of climate Change from December 2024 to February 2025.
16. Food and Agriculture Organization of the United Nations- FAO can support for the development of CFE, collect field data in the designated community forests in Pyapon Township in Ayeyarwady Delta to conduct carbon accounting and estimation of carbon sequestration in (21) Mangrove CF, and collect soil sample from mangrove forest to analyses Soil carbon content (SOC).
17. INGOs such as Diakonie Katastrophenhilfe (DKH) of Germany - DKH, Evangelischer Entwicklungsdienste EED of Germany EED, Bread for the world support financial assistance for mangrove reforestation in Pyindaye reserved forest.
18. Local NGOs such as GEDA, Network Activities Group – Wetland Alliance in Pyapon Township, Myanmar Forest Association-MFA, Biodiversity and Nature Conservation Association (BANCA), Private Plantation owners and association participate community forest development.
19. Local community, villagers, Non Community Forest User Group Members who live in the Pyindaye reserved forest use firewood from mangrove forest.

20. Rice cultivators who expend their agricultural land into the mangrove forest and obstruct the Mangrove Ecosystems Restoration and Community Development Project.
21. Shrimp farming, fish farming enterprise change land use from mangrove forest to shrimp pound, fish pounds and obstruct the Mangrove Ecosystems Restoration and Community Development Project.
22. Dry shrimp processing enterprise use firewood from mangrove forest.
23. Charcoal burning, firewood cutting small, medium scale enterprise harvest fuelwood from the area of Mangrove Ecosystems Restoration and Community Development Project.
24. 'Tiger mouth net'(Kyarr phong) for sea fishing use fuelwood, pole and post, which is harvested from mangrove forest.
25. Researchers, students, who can do research on the fuelwood and charcoal consumption at the city, which do not get electricity regularly.

4.2 Stakeholder analysis



5. Relevancy, Effectiveness, Efficiency and Sustainability

5.1 Relevancy

Mangroves forests cover the major land use in the delta area of the Ayeyarwady Basin. They can reach as far as 60 km inland. Originally, the most extensive mangroves in Myanmar of over 270,000 ha were found in the Ayeyarwady Delta. High human population pressure has led to the loss of over 64% of mangrove cover over the past 35 years, more than 80%. Restoration efforts between 1980 and 2004 resulted in re-planting of 14,000 ha with mangroves in the delta region, mostly on old rice paddies and abandoned agricultural sites. The damage caused by the tropical storm Nargis has been estimated at 35,000 ha of mangrove forest.[1]

In the Ayeyarwady delta in Myanmar, large areas of mangrove forests were converted into paddy fields to cultivate more rice. Abandoned rice field became grasslands. In 1999, ACTMANG started a mangrove community forestry project in the Pyindaye Reserve Forest in the Ayeyarwady delta. Before starting a community forestry project, ACTMANG discussed it with the Forest Department. Since most mangrove forest areas are managed by the Forest Department, the department gives permission to local communities to use and manage forests and resources for a term of 30 years. Once the local community gets permission, they have the responsibility to manage and use the forests and resources by themselves properly. [2]

Evaluation team developed strategic questions to assess relevancy, effectiveness, efficiency and sustainability of Mangrove Ecosystems Restoration and Community Development Project Phase I to Phase V. Evaluation team collected baseline data such as inputs, outputs of the Mangrove Ecosystems Restoration and Community Development Project. Mangrove Ecosystems Restoration and Community Development Project implemented reforestation at the gap of the community forests of the twenty-eight villages. First trip of evaluation team started from 12th June, 2024 to 16th June, 2024.

Relevancy, Effectiveness, Efficiency and Sustainability were evaluated by using strategic question. Strategic questions were developed in Myanmar language and presented in Attachment 2. These questions were asked to the stakeholders in June 15 to 17 June, 2024. List of respondents who provide answers to the strategic questionnaire to evaluate Relevance, Effectiveness, Efficiency and Sustainability is shown in Attachment 3.

The strategic questionnaire to evaluate relevancy includes;

Whether the project's objectives align with the environmental, social, and economic needs of the area.

Assess if the chosen site for mangrove reforestation addresses relevant ecological and community concerns.

Determine if the chosen planting techniques and species selection are suitable for the local environment and ecosystem needs.

Ensure that monitoring efforts focus on key indicators relevant to the project's objectives, such as mangrove growth rates, biodiversity recovery, and community engagement levels.

Determine if the project's adaptive management strategies are relevant to addressing emerging challenges or opportunities.

Evaluate the extent to which the project's outcomes and impacts align with its initial objectives and stakeholder expectations.

Evaluating the relevancy of a Mangrove Ecosystems Restoration and Community Development Project involves assessing various factors to determine its effectiveness and appropriateness within the context of the goals and needs of the local environment and community.

Environmental Impact: Evaluate whether the project addresses relevant environmental issues such as habitat restoration, biodiversity conservation, carbon sequestration, and protection against natural disasters like storm surges and erosion.

Community Engagement: Assess the level of involvement and support from local communities. Relevancy can be determined by considering whether the project aligns with community needs, priorities, and traditional knowledge, and whether it fosters community ownership and participation.

Scientific Basis: Examine whether the project is based on sound scientific research and methodologies. This includes assessing the choice of mangrove species, site selection, and monitoring plans to ensure long-term success.

Socio-economic Benefits: Evaluate the potential socio-economic benefits of the project, such as providing livelihood opportunities through ecotourism, sustainable harvesting of

mangrove resources, or enhancing coastal resilience for nearby communities.

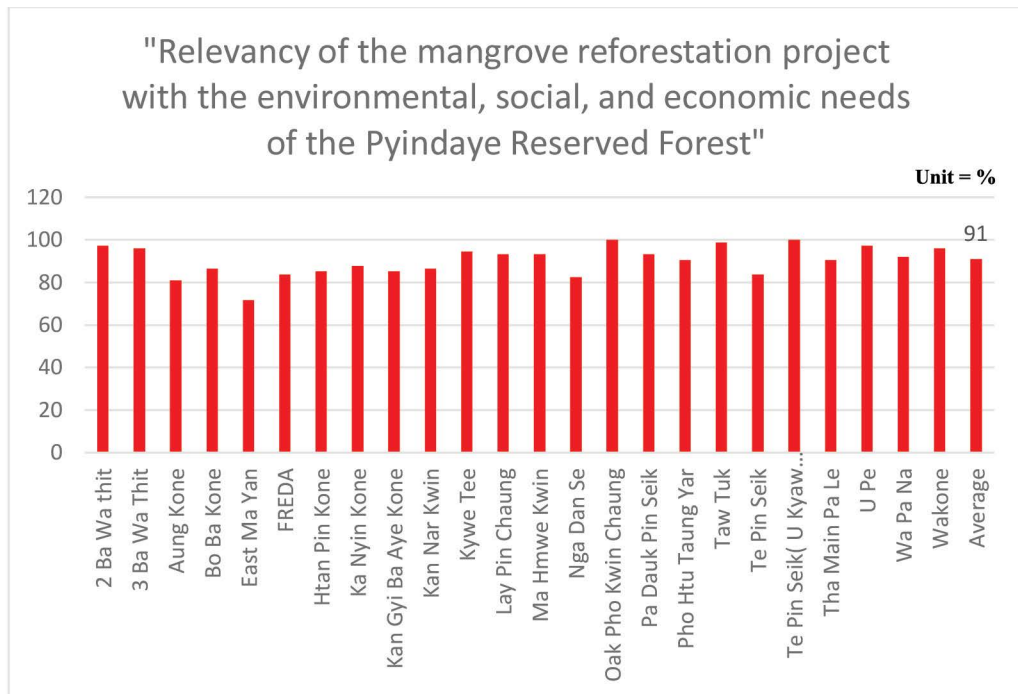
Policy and Legal Framework: Ensure that the project aligns with relevant national and international policies, regulations, and agreements related to biodiversity conservation, climate change mitigation, and sustainable development.

Long-Term Sustainability: Consider whether the project has mechanisms in place to ensure its long-term sustainability, including funding sources, institutional support, and capacity-building efforts for local stakeholders.

Monitoring and Evaluation: Implement a robust monitoring and evaluation framework to continuously assess the progress and impact of the project. This involves tracking key indicators related to mangrove health, biodiversity, community well-being, and ecosystem services.

By evaluating these factors, stakeholders can determine the relevancy of a Mangrove Ecosystems Restoration and Community Development Project and make informed decisions about its planning, implementation, and ongoing management.

The relevance of the Mangrove Ecosystems Restoration and Community Development Project is powerfully illustrated in Mangrove Argyi's poem, which captures the journey from ecological abundance to loss and, ultimately, to hope and restoration. This narrative aligns with FREDa's efforts to combat the destruction of mangroves in the 1990s and 2000s by raising awareness, initiating reforestation, and promoting sustainable livelihoods for local communities. The project also enhances resilience against climate impacts, such as those seen during Cyclone Nargis, while ensuring the long-term survival of mangroves through continuous monitoring, evaluation, and policy advocacy. FREDa's work embodies Argyi's vision of collective action, addressing both immediate community needs and the sustainability of future generations.



(24) stakeholders including CFUG members, chairman, secretary of management committee of community forest, were asked questions, and found that average of the 24 stakeholders is 91%. It has significant relationship with the implementation of mangrove restoration project and mangrove conservation, environmental protection, mangrove ecosystem conservation, and biodiversity conservation.

Therefore, mangrove conservation, environmental protection, Mangrove ecosystem conservation, Biodiversity conservation activities should continue to promote the benefit in all CFs.

5.2 Effectiveness

The strategic questionnaire to evaluate effectiveness includes;

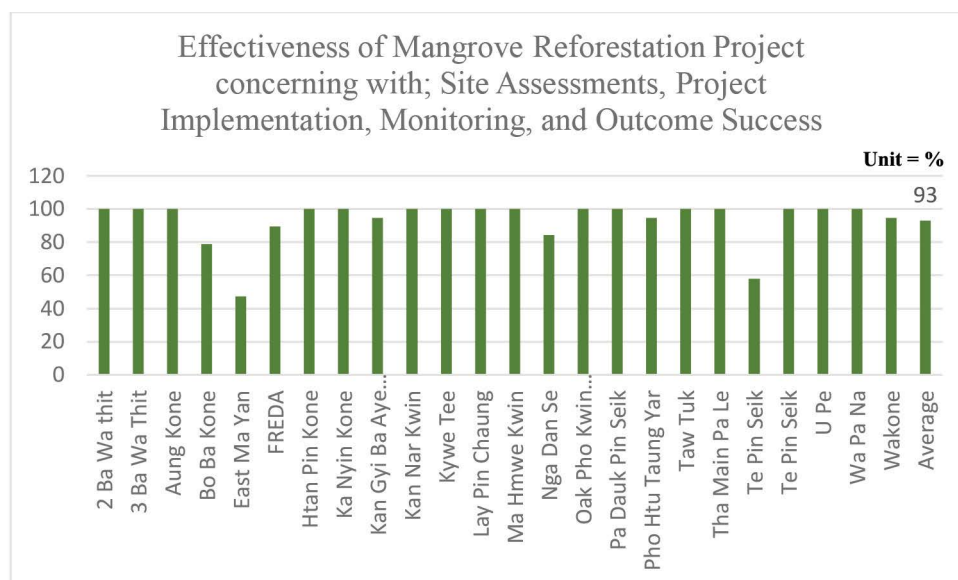
Review the thoroughness of the initial site assessments, stakeholder consultations, and the development of a clear project plan with measurable goals and objectives.

Assess the success of site preparation activities, including soil conditioning, removal of invasive species, and establishment of appropriate planting conditions.

Assess the effectiveness of monitoring protocols in capturing relevant data and identifying potential issues or challenges early on.

Assess the responsiveness of the project team to mid-term review findings and their ability to adjust project activities or objectives as needed.

Assess the overall success of the project in achieving its intended outcomes, such as mangrove habitat restoration, biodiversity conservation, and community benefits.



Mangrove restoration project effectiveness analysis questions were asked to 24 stakeholders including CFUG members, chairman, secretary of management committee of community forest, and 93% answered that it was effective in average. The project activities regarding effectiveness is very effective in average. Therefore, project implementation team need to continue to work hard to achieve 100% efficiency.

FREDA and ACTMANG Mangrove Ecosystems Restoration and Community Development Project implementation team explained the successional trend of abandoned rice fields, depleted mangrove forests, over harvested mangrove forest at coastal lands, and delta areas. Successional trend, from abandoned rice field in the first, followed by emerging mangrove plants naturally through generatic materials in tidal flux, the forests then were cut and this vicious cycle continue on delta area. The successional trend is the natural process of vegetation development and ecosystem recovery over time. This trend can be influenced by factors such as salinity, tidal inundation, soil quality, and seed availability. After abandonment, rice fields often have compacted soils, low organic matter, and high salinity due to tidal influence. Salt-tolerant species (halophytes) and grasses begin to colonize the area. These include: *Acanthus ilicifolius* (a mangrove associate shrub), *Suaeda spp.* (salt-tolerant herbs), *Porteresia coarctata* (wild rice, adapted to saline environments), Myet-kha(*Eriochloa procera*(Poaceae), *Leptochloa chinensis* (Poaceae), *Panicum repens* (Poaceae), *Panicum sarmentosum* (Poaceae), *Pennisetum setosum* (Poaceae), Thon-daunt-myet,(Kyl-

linga monocephala (Cyperaceae), *Kyllinga tenuifolia* (Cyperaceae), thone-daunt-myet, *Kyllinga nemoralis* (Cyperaceae), Khaya, (*Acanthus ebracteatus* (Acanthaceae), *Argemone mexicana* (Papaveraceae), Thet ke (*Imperata cylindrica* (L.) Beauv.), Hnget gyi daung (*Acrostichum aureum*), climbers, **lianas** or **vines** such as *Derris trifoliata*, *Finlaysonia obovata*, *Mucuna gigantea*, *Flagellaria indica* (Rattan-like climber), *Salacia chinensis*. Salt-tolerant species (halophytes), grasses, shrub, herb, and climbers improve soil quality by stabilizing sediments and increasing organic matter. As soil structure improves and organic content increases, mangrove associate species like *Clerodendrum inerme* (coastal shrub), *Derris trifoliata* (woody climber), *Phoenix paludosa* (wild date palm) establish and gradually dominate. These species contribute to further soil stabilization and help reduce salinity. Over time, tidal activity promotes natural dispersal of mangrove propagules (seeds) to the site. Soil salinity and inundation levels determine species establishment. **Pioneer Mangroves** or early colonizers such as: *Avicennia marina* (Grey mangrove), *Sonneratia caseolaris* (Mangrove apple), *Rhizophora mucronata* (Stilt-rooted mangrove) tolerate high salinity, stabilize sediments, and create microhabitats for other mangroves. Soil salinity decreases, organic matter increases, and sedimentation allows for more mangrove species to thrive. A mixed mangrove forest develops with: *Bruguiera spp.* (e.g., *Bruguiera gymnorhiza*), *Ceriops tagal*, *Excoecaria agallocha* (Blind-your-eye mangrove), and these species enhance biodiversity and support fauna like crabs, fish, and birds. The site transforms into a fully functional mangrove forest with improved soil structure, nutrient cycling, and stable hydrology. **Dominant Species** found in mature mangrove forests include species like: *Rhizophora apiculate*, *Xylocarpus granatum*, *Heritiera fomes* (Sundari tree, dominant in some delta areas). These mature forests support rich biodiversity, sequester carbon, and provide ecosystem services. Successional trend of depleted mangrove forest, abandoned rice field depend on **tidal action**: which facilitates propagule dispersal and nutrient replenishment. **Salinity Levels** determines species composition during succession. **Soil fertility** and organic matter buildup supports mangrove colonization. **Seed Source, mother tree**, mature mangrove forests accelerate natural regeneration. The successional trend of abandoned rice fields, degraded mangrove forests, coastal lands, and delta areas begins with the growth of salt-tolerant grasses and pioneer species. Over time, these are followed by early colonizing mangroves, which gradually develop into a diverse and mature mangrove forest. This natural progression helps restore ecosystem services, increases biodiversity, and strengthens coastal resilience. It was learnt that **human Intervention** such as FREDA and ACTMANG mangrove reforestation efforts including the establishment of mangrove plantation, gap planting, regeneration improvement felling can speed up succession of over harvested area, gap area and depleted mangrove area.

The survival percentage of mangrove plantations is a crucial metric for evaluating the effectiveness of a Mangrove Ecosystems Restoration and Community Development

Project. The survival rate reflects the project's ability to establish healthy and thriving mangroves. A high survival rate indicates successful site selection, planting techniques, and maintenance practices. Mangroves provide vital ecological services such as coastal protection, biodiversity conservation, and carbon sequestration. A high survival rate ensures that these benefits are realized. Tracking survival helps assess whether resources (e.g., seedlings, labor, funding) were used efficiently. A low survival rate could indicate wastage or the need for improved methods. Community involvement often enhances survival rates. Measuring survival can help identify areas where local participation needs strengthening. Regular monitoring of survival rates allows project managers to identify challenges (e.g., pest infestations, poor soil quality, or hydrological issues) and make adjustments to improve outcomes.

- **Baseline Data:** Compare survival rates with baseline conditions (e.g., pre-reforestation status).
- **Set Benchmarks:** Define acceptable survival thresholds (e.g., 70-90%) depending on the local context and species used.
- **Analyze Causes of Mortality:** Investigate factors affecting survival, such as tidal patterns, soil salinity, or grazing pressure, and address them.
- **Track Long-Term Impact:** Measure survival rates over time (e.g., 6 months, 1 year, 5 years) to assess long-term sustainability.

While survival percentage is vital, it should be combined with other indicators for a holistic evaluation:

- **Growth Rates:** Measure tree height, canopy spread, or biomass accumulation.
- **Biodiversity Levels:** Assess species richness and habitat recovery.
- **Community Benefits:** Evaluate socio-economic impacts like income generation and resource availability.
- **Ecosystem Services:** Monitor improvements in soil stabilization, carbon storage, and fishery productivity.

By integrating survival percentages with broader ecological and socio-economic metrics, we can ensure a more comprehensive assessment of our Mangrove Ecosystems Restoration and Community Development Project's effectiveness.

Survival counting is done in December after planting seedlings at annual reforestation project sites. The high first-year survival rate of over 90% is a positive indicator of the seedlings' initial adaptation to the environment under the shade of mangrove trees. However, several factors will influence their long-term survival and growth.

1. Growth and Survival Under Shade

- **Mangrove canopy density:** The dense shade can reduce sunlight availability, slowing the seedlings' growth. Mangroves are typically sun-loving species; prolonged shade might lead to competition for light and stunted growth.
- **Species adaptability:** If the seedlings are shade-tolerant mangrove species, they may adapt well to the conditions. If not, their health might decline over time unless the canopy opens up.

2. Natural Thinning

- **Competition for resources:** As seedlings grow, competition for light, nutrients, and space will naturally thin out weaker individuals.
- **Mortality rate in later years:** Survival rates typically decrease in subsequent years due to this competition and environmental pressures. A 10-20% annual decline in survival is common in such conditions if no intervention is taken.

3. Environmental Pressures

- **Hydrological changes:** If water flow, salinity, or tidal inundation patterns change, this could stress the seedlings, particularly those less established.
- **Pests and diseases:** young seedlings are more vulnerable to pests, fungal infections, or herbivory, which could reduce survival rates.

4. Adaptation and Intervention

- **Thinning or canopy management:** If the shade is too dense, strategic thinning of the canopy or transplantation of seedlings to areas with better light can help promote survival and growth.
- **Nutrient supplementation:** Mangrove ecosystems are nutrient-sensitive. If nutrient levels are low, additional support through organic mulches or nutrient cycling interventions could help seedlings thrive.

Estimated Survival Over 5 Years

- **Without intervention:** Survival may decrease to around 50-70% as weaker seedlings succumb to competition or unfavorable conditions.
- **With intervention:** Survival rates could stabilize at 70-85%, particularly if active measures are taken to address shade, competition, and other stressors.

1. Interventions for Seedling Survival and Growth

A. Light Management

- Selective canopy thinning: Gradually remove older or less productive mangrove trees to allow more sunlight to reach the seedlings. This should be done carefully to avoid destabilizing the soil or impacting the ecosystem.
- Strategic transplantation: Move seedlings from dense shaded areas to more open spaces where they can receive adequate sunlight.

B. Nutrient and Soil Management

- Enrich the soil: Apply organic mulches or compost around the seedlings to improve nutrient availability and retain moisture. Ensure it is mangrove-safe and free of contaminants.
- Encourage nutrient cycling: Plant nitrogen-fixing species like *Sesbania* or *Acacia* nearby to enrich the soil naturally.

C. Hydrology Management

- Maintain tidal inundation: Ensure proper water flow around the seedlings to prevent waterlogging or dryness. Regularly monitor salinity levels to avoid stress.
- Reduce erosion risks: Use bioengineering techniques like planting vetiver grass or coconut fiber mats to stabilize soil and protect seedlings from being washed away.

D. Pest and Disease Management

- Natural pest repellents: Introduce Neem-based treatments or grow pest-repellent plants like *Clerodendrum* nearby.
- Biodiversity buffers: Encourage the presence of natural predators, such as crabs or birds, to control pest populations.

E. Community-Based Care

- Engage local communities: Train local groups in seedling monitoring, mulching, and weeding to ensure regular care.
- Youth participation: Encourage school or youth groups to take part in periodic “tree health” drives to keep seedlings in good condition.

2. Monitoring Techniques

A. Survival Tracking

- Yearly survival counts: Conduct annual counts to measure survival rates, noting any changes in environmental conditions.
- Growth monitoring: Record metrics such as height, diameter, and leaf health every 6 months.

B. Health and Stress Indicators

- Leaf discoloration: Yellowing leaves might indicate salinity stress or nutrient deficiency.
- Stem and root conditions: Check for signs of rot or fungal infection.

C. Soil and Hydrology Assessment

- Soil quality tests: Measure salinity, pH, and organic matter annually to ensure the soil remains conducive for growth.
- Water dynamics: Use simple tidal gauges or markers to monitor water levels and flow patterns.

D. Adaptive Measures Based on Data

- Use data from monitoring to guide interventions. For instance, if salinity stress is noted, enhance flushing of the soil with freshwater where possible.

3. Periodic Evaluations

- Biodiversity surveys: Track the return of wildlife to assess ecological benefits.
- Socio-economic impacts: Engage communities to document benefits such as improved fish stocks or new livelihood opportunities.

5.3 Efficiency

The strategic questionnaire to evaluate efficiency includes;

Assess the allocation of resources (time, funding, personnel) during the planning phase. Were resources utilized effectively to establish a solid foundation for subsequent phases?

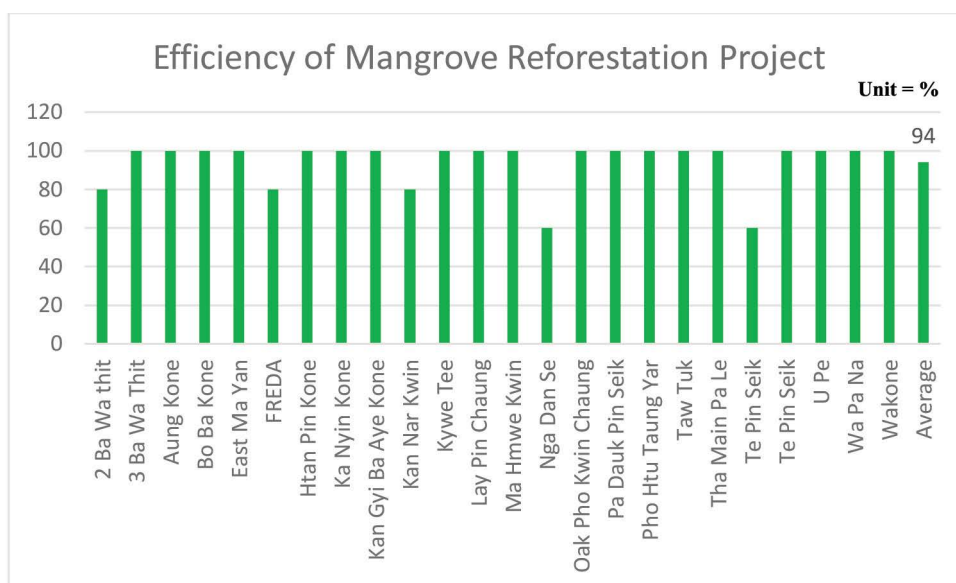
Evaluate the efficiency of mangrove planting operations, including the use of labor, equipment, and materials, against the targeted planting goals.

Evaluate the efficiency of maintenance activities, such as weeding, and protection from threats like pests, forest fire, mangrove young seedling destroyed by crab, destruction by tidal wave, or illegal harvesting.

Evaluate the efficiency of resource reallocation or re-prioritization in response to mid-term review recommendations.

Determine if the project achieved its goals within the allocated timeframe and budget, and whether resources were utilized efficiently.

Proper allocation of resources (time, funds, personnel) during the stages of the forest restoration project Phase I to Phase V; Analyzing questions about the efficient use of resources, 24 stakeholders including CFUG members, chairman, secretary of management committee of community forest were asked, and 94% responded that they were effectively used. Continue to develop a strategy to be able to use the full percentage effectively.



Value for Money

Value for money (VfM) is a measure of how efficiently resources (time, money, and effort) are used to achieve desired outcomes. It encompasses four key elements: economy, efficiency, effectiveness, and equity. In Mangrove Ecosystems Restoration and Community Development Projects:

1. Economy: Ensuring inputs (labor, seedlings, tools) are procured at the lowest cost without compromising quality.
2. Efficiency: Maximizing outputs (e.g., hectares of mangroves restored) relative to inputs used.

3. Effectiveness: Achieving project objectives, such as improved ecosystem services and community resilience.
4. Equity: Distributing benefits fairly among stakeholders, especially marginalized communities.

Efficiency is a critical component of VfM, as it focuses on how well the project converts investments into tangible outputs and outcomes. High efficiency ensures that resources are not wasted and contribute maximally to the project's success.

Evaluating Value for Money in a Mangrove Ecosystems Restoration and Community Development Project

An evaluation team assesses VfM using qualitative and quantitative approaches, considering:

1. Financial Metrics:

- Cost-Effectiveness Analysis (CEA): Compares the cost per hectare restored or per ton of CO₂ sequestered.
- Cost-Benefit Analysis (CBA): Assesses the economic returns from ecosystem services (e.g., fisheries, storm protection) versus investment costs.

2. Project Outcomes and Impacts:

- Ecological: Increase in mangrove cover, biodiversity, and ecosystem resilience.
- Socio-Economic: Improvement in local livelihoods, enhanced food security, and disaster risk reduction.
- Climate: Carbon sequestration and mitigation of climate change effects.

3. Sustainability:

- Evaluating long-term viability, such as the survival rate of planted mangroves and community engagement.

4. Stakeholder Perspectives:

- Gathering feedback from communities, local authorities, and project partners to assess perceived benefits and challenges.

5. Benchmarking:

- Comparing results with similar projects to determine relative performance.

Systematic Usage of Investment in Mangrove Ecosystems Restoration and Community Development Projects

A systematic approach to investment ensures resources are allocated and utilized effectively:

1. Planning and Prioritization:

- Detailed site assessments to identify the most degraded areas and prioritize interventions with the highest potential impact.

2. Resource Allocation:

- Allocating funds to critical activities such as nursery development, community training, planting, and monitoring.

3. Capacity Building:

- Investing in training local communities and stakeholders to enhance ownership and improve implementation efficiency.

4. Monitoring and Evaluation:

- Regular assessments to track progress, measure impacts, and adjust strategies to optimize outcomes.

5. Transparent Reporting:

- Clear documentation of financial flows and project results to ensure accountability.

6. Leveraging Co-Benefits:

- Integrating activities that provide multiple benefits, such as agroforestry systems, to maximize returns on investment.

Through these measures, the project ensures that financial inputs are translated into sustainable ecological, social, and economic outcomes, reinforcing the project's overall value for money.

Resource Allocation:

According to the FRED/ACTMANG Mangrove Project Financial Plan of July to December 2019, it was found that "91.5 % of funds were allocated in 2019 for critical activities such as site selection, survey, site preparation, stake purchasing, staking, nursery development, seedling production, seedling transportation, planting, weeding, survival counting, fixing plantation signboard, communication, stationary, diesel, staff salary, staff's Daily Subsistence Allowance- DSA, and staff traveling allowance-TA. 8.5% was used for boat maintenance, Oakpho and Bahosi camp maintenance, fuel cost of Secretary's car and Car Maintenance for Secretary's car."

Table 5.1 FRED/ACTMANG Mangrove Project Financial Plan of July to December 2019

Sr.	Activities	%
A	Program Cost	
1	Site Selection & Survey	1.0
2	Site Preparation	6.2
3	Stake purchasing	1.0
4	Staking	2.1
5	Seedling transportation	6.7
6	Planting	6.2
7	Weeding	4.1
8	Survival counting	0.4
9	Seedling Production	23.6
10	Installation of plantation signboard	0.2
11	Communication and stationary cost	1.3
12	Cost of diesel	1.2
13	Staff salary	32.0
14	Staff DSA	3.9
15	Staff TA	1.5
	Sub-total for program cost	91.5
B	Operation Cost	-
16	Boat maintenance cost	3.3
17	Oak Pho camp maintenance cost	2.0
18	Bohosi camp maintenance cost	-
19	Fuel cost of Secretary's car	2.5
20	Car Maintenance for Secretary's car	0.7
	Sub-total	8.5
	Grand total	100.0

According to the FRED/ACTMANG Mangrove Project Phase V Financial Plan 2022 (Jan to Dec), it was found that “92 % of funds were allocated in 2022 for critical activities, 8% was used for boat maintenance, Oakpho and Bahosi camp maintenance, fuel cost of Secretary’s car and Car Maintenance for Secretary’s car.

**Table 5.2 FRED/ACTMANG Mangrove Project Phase V Financial Plan 2022
(Jan to Dec)**

Sr.No	Activities	% of Total Budget
A	Program Cost	
1	Site Selection & Survey	1.0
1	Site Selection & Survey	1
2	Site Preparation	4
3	Stake purchasing	1
4	Staking	1
5	Seedling transportation	4
6	Planting	4
7	Weeding	2
8	Survival counting	2
9	Seedling Production	11
10	Installation of plantation signboard	0
11	Communication and stationary cost	1
12	Cost of diesel	2
13	Staff salary	48
14	Staff DSA	8
15	Staff TA	4
	Sub-total	92
B	Operation Cost	-
18	Boat maintenance cost	1
19	Camps maintenance cost	2
20	Fuel cost of Secretary's car	2
21	Car Maintenance for Secretary's car	1
	Monitoring and Evaluation	1
	Reporting	0
22	Best Plantation Prize	0
	Sub-total	8
	Grand total	100

Table 5.3 FRED/ACTMANG Mangrove Project Phase V Financial Plan

Sr.	Activities	%
A	Program Cost	
1	Site Selection & Survey	1.02
2	Site Preparation	5.09
3	Stake purchasing	1.23
4	Staking	2.04
5	Seedling transportation	4.07
6	Planting	5.09
7	Weeding	2.65
8	Survival counting	2.04
9	Seedling Production	13.43
10	Installation of plantation signboard	0.22
11	Communication and stationary cost	0.49
12	Cost of diesel	2.54
13	Staff salary	39.37
14	Staff DSA	5.88
15	Staff TA	3.71
	Sub-total	88.85
B	Operation Cost	-
16	Boat maintenance cost	0.98
17	Camps maintenance cost	2.04
18	Fuel cost for office car	2.93
19	Car Maintenance for office car	1.17
20	Monitoring and Evaluation	0.98
21	Reporting	0.81
22	Meeting	0.33
23	Best Plantation Prize	0.41
24	Unexpected Cost	1.52
	Sub-total	9.64
	Grand total	100.00

According to the FRED/ACTMANG Mangrove Reforestation Program (Phase VI) Project (Budget Plan for Year 2024 to 2028), it was found that “79.22% of funds are allocated for

operation Cost (Direct Cost) including for critical activities such as site selection, survey, site preparation, stake purchasing, staking, nursery development, seedling production, seedling transportation, planting, patching, first weeding, second weeding, survival counting, fixing plantation signboard, communication, stationary, diesel, staff salary, staff's Daily Subsistence Allowance- DSA, and staff traveling allowance-TA. 20.78% is used for M & E Officer, Treasurer, Communication Officer, Cashier, Communication and stationary cost, fuel cost for Head Office Car, Unexpected Cost, FREDA Overhead Cost.

**Table 5.4 FREDA/ACTMANG Mangrove Reforestation Program (Phase VI)
Project (Budget Plan for Year 2024 to 2028)**

Sr.	Activities	% of total cost
A	Operation Cost (Direct Cost)	
1	Site Selection & Survey	1.19
2	Site Preparation	11.90
3	Stake Collection	2.16
4	Staking	3.57
5	Seedling transportation	7.20
6	Planting	8.33
7	Patching	1.79
8	First Weeding	4.76
9	Second Weeding	3.57
10	Seedling Production	10.08
11	Installation of plantation signboard	0.06
12	Survival Counting	0.95
13	Plantation Pillar (3no. for 250 Acre)	0.03
14	Cost of diesel	1.71
15	Office Rental	0.57
16	Field Staff Salary	
	Project Manager	2.86
	Project Assistant - 2 no.	4.57
	Field Staff - 3 no.	5.14
	Boad Driver	1.14
	Camp Watcher	1.03
17	<i>Field Staff DSA</i>	-
	Project Manager	0.57

	Project Assistant - 2 no.	0.80
	Field Staff - 3 no.	1.20
	Boad Driver	0.40
18	<i>Field Staff TA</i>	2.97
	Project Manager	0.86
	Project Assistant - 2 no.	1.14
	Field Staff - 3 no.	0.86
		2.86
19	Monitoring, Evaluation & Reporting	0.76
	Direct Cost - Sub-total	79.22
B	Indirect Cost	-
20	<i>Head Office Staff Salary</i>	-
	M & E Officer	2.57
	Treasurer	2.57
	Communication Officer	2.00
	Cashier	1.83
		8.97
21	Communication and stationary cost	0.48
22	MV fuel cost for Head Office Car	1.14
23	Unexpected Cost	0.19
24	FREDA Overhead Cost - 10%	10.00
		11.81
	Indirect Cost - Sub-total	20.78
	Grand total	100.00

Cost-Effectiveness Analysis (CEA):

Mangrove Ecosystems Restoration and Community Development Project invested 1,190,500 US\$ to establish 3050 ha of mangrove plantation and regeneration improvement felling within twenty-five years from 1999 to 2023. If we assume that the age of the plantation, species, site quality, and survival rate remain constant, the average volume of one hectare of mangrove plantation is 43 cubic meters. Therefore, the total volume for the 3,000 hectares of mangrove plantations established by FREDA, ACTMANG, and 28 CFUGs is estimated to be 129,000 cubic meters. The estimated value of 129,000 cubic meters of carbon sequestration in the carbon market could be around \$3.48 million at \$30/

ton CO₂e. The value of carbon stored in mangrove plantation is estimated as follow;

- At \$5 per ton, the value of carbon stored in 3,000 ha of mangrove forest is estimated to be between \$27.5 million and \$60.6 million.
- At \$50 per ton, the value ranges from \$275.3 million to \$605.6 million.
- At \$100 per ton, the value could be between \$550.5 million and \$1.21 billion.

We analyze the investment, ecological impact, and economic value of the Mangrove Ecosystems Restoration and Community Development Project:

1. Investment Cost:

- Total investment: \$1,190,500 over 25 years for 3,050 hectares.
- This translates to approximately \$390 per hectare.

2. Ecological Output:

- Average volume per hectare: 43 cubic meters.
- Total estimated volume for 3,000 hectares: 129,000 cubic meters.
- Significant carbon sequestration potential due to mangroves' high carbon storage capacity.

3. Economic Value of Carbon Sequestration:

- Market Value Estimates:
 - At \$30/ton CO₂e: Estimated value is \$3.48 million for the carbon sequestration in 3,000 ha.
 - At \$5 to \$100/ton CO₂e:
 - \$5/ton: \$27.5M–\$60.6M.
 - \$50/ton: \$275.3M–\$605.6M.
 - \$100/ton: \$550.5M–\$1.21B.

4. Return on Investment (ROI):

- Even at the lowest carbon price (\$5/ton), the estimated value of the stored carbon significantly exceeds the investment cost by over 23 times (\$27.5M vs. \$1.19M).
- At higher carbon prices (\$50–\$100/ton), the project delivers an exponential ROI, making it economically and environmentally beneficial.

5. Sustainability Considerations:

- The project offers co-benefits such as biodiversity enhancement, coastal protection, and improved livelihoods for community forest user groups (CFUGs).
- It contributes to climate change mitigation goals, which aligns with global environmental priorities.

The Mangrove Ecosystems Restoration and Community Development Project demonstrates exceptional value both ecologically and economically:

1. **Cost-Effectiveness:** With a modest initial investment of \$1.19M, the potential returns through carbon sequestration and ecosystem services far outweigh the costs.
2. **Environmental Impact:** The project effectively contributes to carbon storage, climate resilience, and biodiversity conservation.
3. **Economic Potential:** Even under conservative pricing scenarios, the carbon sequestration value positions the project as a lucrative investment in environmental sustainability.

Recommendation:

- **Scaling and Replication:** This model can be replicated in other regions to maximize climate and economic benefits.
- **Carbon Market Engagement:** Efforts should focus on tapping into premium carbon markets to maximize financial returns.
- **Continuous Monitoring:** Regularly assess survival rates, growth, and carbon sequestration to optimize outcomes over time.

5.4 Sustainability

The strategic questionnaire to evaluate efficiency includes;

Consider the incorporation of sustainability principles into the project design, such as long-term monitoring plans, community engagement strategies, and adaptive management practices.

Consider the use of sustainable planting practices, such as sourcing mangrove propagules from local sources, minimizing habitat disturbance, and promoting natural regeneration where feasible.

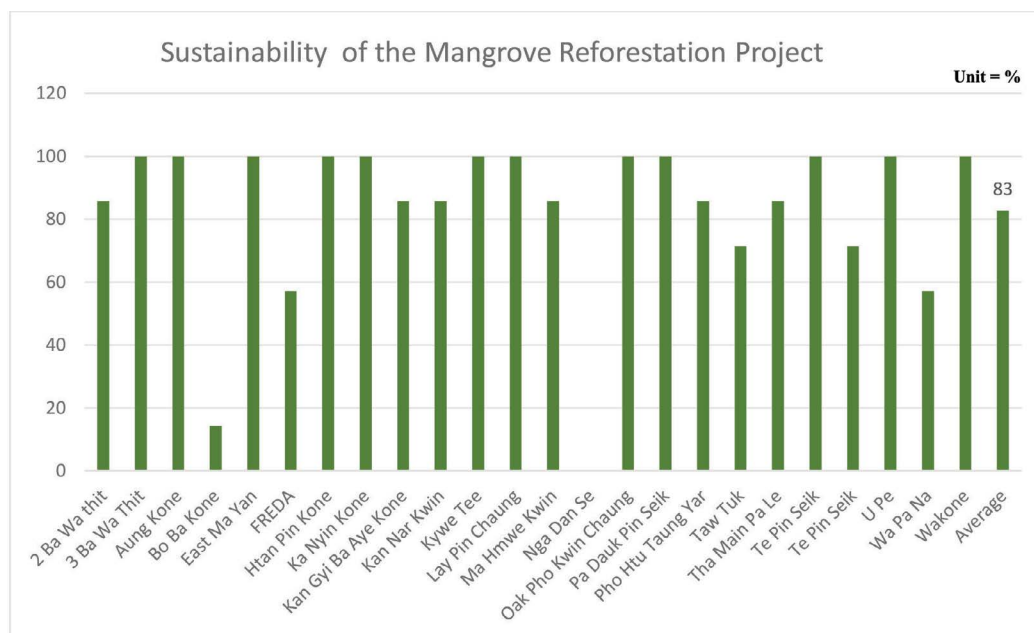
Review the capacity-building efforts aimed at empowering local communities to take on monitoring and maintenance responsibilities over the long term.

Consider the integration of lessons learned from the mid-term review into project planning and implementation to enhance long-term sustainability.

Review the project's legacy in terms of its lasting impact on the environment, community resilience, and institutional capacity for future mangrove conservation efforts.

When (24) stakeholders, including CFUG members, chairman, secretary of management committee of community forest was asked questions about the sustainability of the plantations in the forest owned by the local people's group that were established and cultivated by the mangrove restoration project, 83% answered that they are working to make it sustainable.

Therefore, cooperation with stakeholders should be increased to achieve long-term sustainability.



The sustainability of the mangrove restoration project was assessed through data collected by the Ecosystem Conservation and Community Development Initiative (ECCDI) in collaboration with the Food and Agriculture Organization of the United Nations (FAO). Field data were gathered in designated forested area of community forests (CFs) in Pyapon Township, Ayeyarwady Delta, focusing on tree enumeration at 25 square meter plots across 21 Mangrove CFs, including twelve CFs where gap planting or artificial regeneration was conducted by FREDA and ACTMANG.

Undergrowth, Advanced Growth, and Regeneration in Mangrove Forest Areas

According to ECCDI's Final Narrative Report, the following results were observed at

forested area:

- 4,550 trees/ha categorized as “established” (DBH < 5 cm, H ≥ 3 m),
- 7,112 trees/ha categorized as “unestablished” (DBH < 5 cm, 20 cm ≥ H < 3 m),
- 4,880 trees/ha categorized as “recruits” (current-year seedlings with 2-4 leaves).

This totals to 20,661 trees/ha found as part of the undergrowth, advanced growth, or regeneration within the study area. These findings highlight the natural regeneration capacity of the mangrove ecosystem, ensuring its long-term sustainability. Even in cases where illegal logging occurs, the presence of undergrowth and advanced growth indicates a promising ability to replace the canopy over time. This natural regeneration or artificial regeneration process strengthens the resilience of the restored mangrove forests, contributing to their sustainability and long-term survival.

Sr	Name of CF	Established (DBH < 5cm, H ≥ 3m)	Unestablished (DBH < 5cm, 20cm ≥ H < 3m)	Recruits (current yr seeding with 2-4 leaves)	Total
1	Ah Shae Phyar	1,200	3,600	4,880	9,680
2	Bawa-Thit-3 CF (U Thein Han)	5,067	9,600	-	14,667
3	Ba Wa Thit-3 Cf (U Tin Win)	9,133	9,667	24,133	42,933
4	HTAN PIN KONE CF	4,057	3,886	6,114	14,057
5	Kanyin Kone CF	4,057	3,886	6,114	14,057
6	Kywe Te CF	3,133	13,600	16,800	33,533
7	Lay Pin Chaung CF	5,333	5,867	4,400	15,600
8	Ma Hmwe Kwin Cf (U Myint Soe)	2,629	3,429	3,086	9,143
9	Ngar Dan Se CF	3,200	800	2,400	6,400
10	Te Pin Seik CF	2,600	12,700	5,500	20,800
11	Wah Kone CF	1,800	9,000	19,244	30,044
12	Wah Pa Na CF	12,400	9,314	15,314	37,028
	12 CF total	54,609	85,349	107,985	247,942
	Average/ ha	4550	7112	8998	20661

Source: ECCDI’s Final Narrative Report of Field Data Collection In Community Forests, in Pyapon Township, Ayeyarwady Delta (January 2024)

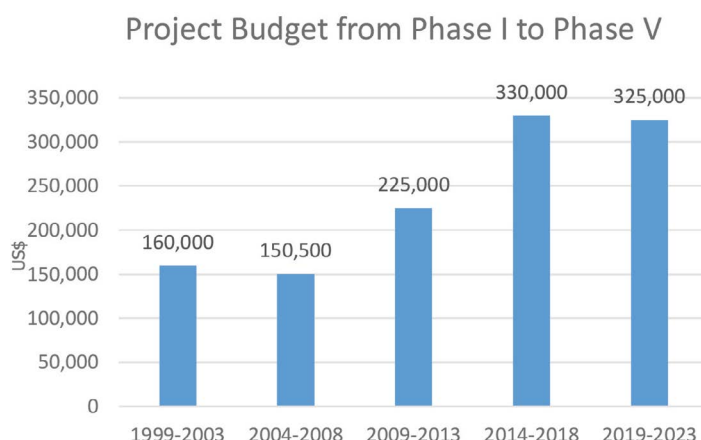
6. Inputs, Output, Outcomes, Impacts and most significant changes of the Mangrove Reforestation Project

6.1 Inputs:

ACTMANG Japan contributed US \$ 1,190,500 as a grant aid for Mangrove Ecosystems Restoration and Community Development Project. Inputs include direct cost for tree planting, Regeneration Improvement Felling- RIF in 28 villages in Pyindaye reserved forest, Pyarpon township, Ayeyarwaddy region, Myanmar, and management cost, procurement of boat, equipment etc.

Table 6.1 Contribution of ACTMANG Japan to restore mangrove forest.

Sr	Phase	Year	Hectare	Cost US \$	CF
1	Phase I	1999-2003	500	160,000	10
2	Phase II	2004-2008	550	150,500	12
3	Phase III	2009-2013	750	225,000	17
4	Phase IV	2014-2018	750	330,000	22
5	Phase V	2019-2023	500	325,000	11
		25 Years	3050	1,190,500	



6.2 Outputs:

6.2.1 Mangrove Ecosystems Restoration and Community Development Project Phase I

In Mangrove Ecosystems Restoration and Community Development Project Phase I, the following ten forest user groups were formed in Pyindaye Reserved Forest, Pyapon Township, Pyapon District, Ayeyarwady Region, Myanmar from 1999 to 2003. A total of 516 households were members of forest user groups and they established (613 ha) of mangrove plantation including regeneration improvement felling and enrichment planting. The name of the community forests are 2-Bawathit, 3-Bawathit, Kanyin Kone, Kharchin, Kwetae, Ma Hmwe Kwin, Oak Hpo Kwin Chaung, Padauk Pin Seik, Telpin Seik, and Warkone villages. [3] Outputs of the Mangrove Ecosystems Restoration and Community Development Project Phase I can be seen at the following table.

Table 6.2 Outputs of the Mangrove Ecosystems Restoration and Community Development Project Phase I

Sr	Name of CF	Area of plantation and Regeneration Improvement Felling, gap planting (ha)					
		1999	2000	2001	2002	2003	Phase I total
1	2-Bawathit	0	0	0	0	29	29
2	3-Bawathit	0	0	0	0	21	21
3	Kanyin Kone	0	0	40	73	2	116
4	Kharchin	0	0	30	10	0	40
5	Kwetae	0	0	28	20	3	52
6	Ma Hmwe Kwin	0	0	12	20	13	46
7	Oak Hpo Kwin Chaung	26	55	8	8	0	97

8	Padauk Pin Seik	0	0	0	0	29	29
9	Telpin Seik	25	30	12	10	0	78
10	Warkone	0	57	20	20	10	107
	Total	51	142	152	162	107	613

6.2.2 Mangrove Ecosystems Restoration and Community Development Project Phase II

In Mangrove Ecosystems Restoration and Community Development Project Phase II, twelve forest user groups in Pyindaye Reserved Forest, Pyapon Township, Pyapon District, Ayeyarwady Region, Myanmar, were formed in thirteen villages from 2004 to 2008. A total of 375 households were members of forest user groups and they established (680 ha) of mangrove plantation including regeneration improvement felling and enrichment planting. The name of the community forests are 2-Bawathit, 3-Bawathit, Ashe Phyar, Kanyin Kone, Kwetae, Ma Hmwe Kwin, Oak Hpo Kwin Chaung, Padauk Pin Seik, Thamein Pale, U Pae, War Pa Na, and Warkone. [3]

Outputs of the Mangrove Ecosystems Restoration and Community Development Project Phase II can be seen in the following table.

Table 6.3 Outputs of the Mangrove Ecosystems Restoration and Community Development Project Phase II

Sr	Name of CF	Area of plantation and Regeneration Improvement Felling, gap plantation (ha)					
		2004	2005	2006	2007	2008	Phase II Total
1	2-Bawathit	21	19	12	8	6	67
2	3-Bawathit	23	15	11	11	11	70
3	Ashe Phyar	12	13	3	0	0	27
4	Kanyin Kone	10	9	7	0	14	41
5	Kwetae	12	15	10	0	12	49
6	Ma Hmwe Kwin	14	0	0	0	0	14
7	Oak Hpo Kwin Chaung	0	0	0	41	19	61
8	Padauk Pin Seik	22	14	9	8	12	65
9	Thamein Pale	32	24	14	7	8	85
10	U Pae	32	21	15	0	0	68
11	War Pa Na	27	25	17	17	11	98
12	Warkone	10	2	7	9	8	36
		216	157	105	101	101	680

6.2.3 Mangrove Ecosystems Restoration and Community Development Project Phase III

Mangrove Ecosystems Restoration and Community Development Project Phase III was implemented at the (17) villages including 2-Bawathit, 3-Bawathit, Aumg Kone, Kan Gyi Ba Aye, Kanyin Kone, Kwetae, Kyauk Taing, Lay Pin Chaung, Nout Pyan Toe, Oak Hpo Kwin Chaung, Padauk Pin Seik, Phoe Htoo Taung Yar, Telbin Seik, Thamein Pale, U Pae, War Pa Na, and Warkone community forests in Pyindaye Reserved Forest, Pyapon Township, Pyapon District, Ayeyarwady Region, Myanmar from 2009 to 2013. CFUG established (627) ha of mangrove plantations, regeneration improvement felling, gap planting and enrichment planting. Outputs of the Mangrove Ecosystems Restoration and Community Development Project Phase III is shown in the following table.[6.4]

Table 6.4 Outputs of the Mangrove Ecosystems Restoration and Community Development Project Phase III

Sr	Name of CF	Area of plantation and Regeneration Improvement Felling, gap plantation (ha)					
		2009	2010	2011	2012	2013	Phase III Total
1	2-Bawathit	4	2	0	15	0	21
2	3-Bawathit	1	0	7	4	0	12
3	Aumg Kone	0	23	8	0	0	32
4	Kan Gyi Ba Aye	4	2	0	0	0	6
5	Kanyin Kone	6	1	6	0	0	13
6	Kwetae	14	6	5	0	0	25
7	Kyauk Taing	0	0	34	0	0	34
8	Lay Pin Chaung	14	0	0	0	0	14
9	Nout Pyan Toe	0	0	9	0	0	9
10	Oak Hpo Kwin Chaung	30	26	40	39	65	200
11	Padauk Pin Seik	8	12	13	23	0	56
12	Phoe Htoo Taung Yar	0	32	0	0	0	32
13	Telbin Seik	4	3	1	0	0	8
14	Thamein Pale	10	26	11	0	17	65
15	U Pae	12	9	9	0	14	43
16	War Pa Na	14	17	14	0	5	51
17	Warkone	0	1	5	0	0	6
	Sub-total	121	161	162	81	101	627

6.2.4 Mangrove Ecosystems Restoration and Community Development Project Phase IV

Mangrove Ecosystems Restoration and Community Development Project Phase IV was implemented at the 22 community forests in Pyindaye Reserved Forest, Pyapon Township, Pyapon District, Ayeyarwady Region, Myanmar. The name of the villages are 2- Ba Wa Thit, 3-Ba Wa Thit, East Mayang, Bo Ba Kone, Htan Pin Kone, Ka Nyin Kone, Kan Gyi Ba Aye, Kanyin Kone (Island), Khar Chin Kyun, Kywe Tae, Ma Hmwe Kwin, Nga Tan Se, Oak Hpo, Pa Dauk Pin Seik, Pho Htoo Taung Yar, Taw Tuk, Tebin Seik, Tha Mein Pale, U Pe, War Pa Na, Warkone, and West/ Anauk Ma Yan. CFUG established (759) ha of mangrove plantations, regeneration improvement felling, gap planting and enrichment planting. Outputs of the Mangrove Ecosystems Restoration and Community Development Project Phase IV is shown at the following table.[6.5]

Table 6.5 Outputs of the Mangrove Ecosystems Restoration and Community Development Project Phase IV

Sr	Name of CF	Area of plantation (ha)					
		2014	2015	2016	2017	2018	Phase IV total
1	2- Ba Wa Thit	13					13
2	3-Ba Wa Thit		7			0.8	8
3	East Mayang				16.2		16
4	Hpo Ba Kone	53					53
5	Htan Pin Kone					16.2	16
6	Ka Nyin Kone	18	20	26	44.6	8.5	117
7	Kan Gyi Ba Aye		12	10			22
8	Kanyin Kone (Island)					5.7	6
9	Khar Chin Kyun		9				9
10	Kywe Tae		19	6	2	2	29
11	Ma Hmwe Kwin					4.1	4
12	Nga Tan Se					2	2
13	Oak Hpo	23	35	38	20.3	37.3	154
14	Pa Dauk Pin Seik	5	13	10	10.1		38
15	Pho Htoo Taung Yar				4.1	15.4	19
16	Taw Tuk					33.6	34
17	Tebin Seik				30.4		30

18	Tha Mein Pale	11	16	12			39
19	U Pe	18	12	9		10.5	49
20	War Pa Na	11	9	10		8.1	38
21	Warkone			17		0.8	18
22	West/ Anauk Ma Yan			12	26.3	6.9	45
		152	152	152	153.9	151.9	759

6.2.5 Mangrove Ecosystems Restoration and Community Development Project Phase V

Mangrove Ecosystems Restoration and Community Development Project Phase V was implemented at the 11 community forest in Pyindaye Reserved Forest, Pyapon Township, Pyapon District, Ayeyarwady Region, Myanmar from 2019 to 2023. The name of the community forest are (3) Bawathit, Kadat Kwin, Kannar Kwin, Kanyin Kone (Karchin Kyun), Kwe Tae, Lay Pin Chaung, Ma Hmwe Kwin, Ngadanse, Oakpo Kwin Chaung, Padauk Pin Seik, and Wapanar. Outputs of the Mangrove Ecosystems Restoration and Community Development Project Phase V.

Table 6.6 Outputs of the Mangrove Ecosystems Restoration and Community Development Project Phase V

Sr	Village	Area of plantation (ha)					
		2019	2020	2021	2022	2023	Phase V Total
1	(3) Bawathit				12	20	32
2	Kadat Kwin					4	4
3	Kannar Kwin	20	20	30.4	40	24	136
4	Kanyin Kone (Karchin Kyun)	12	12	2		6	32
5	Kwe Tae	10	10	2.8			23
6	Lay Pin Chaung					16	16
7	Ma Hmwe Kwin	10	10	10.1			30
8	Ngadanse	10	10	12.1	6	6	45
9	Oakpo Kwin Chaung			20.2	20	6	47
10	Padauk Pin Seik			11.7	6	6	24
11	Wapanar	38	38	11.7	16	12	117
		100	100	100	100	100	500

According to the data received from Pyarpon township forest department, it is known that the Pyindaye reserved forest have 45 community forest user group, and they were issued community forest certificate at 14932.45 acre/ 6043 ha. FRED A mangrove reforestation team selected 5670 ha of 28 villages from Pyindaye reserved forest for mangrove reforestation. Project planted mangrove tree species at 3179 ha of community forest, and it exceed 179 ha more than targeted area of 3000 ha. So, it can be concluded that 56% of community forest area of 28 villages had been reforested.

Among the 28 villages, Kadat Kwin ,Kyauk Taing, and Nout Pyan Toe villages need to get the permission for community forestry from the Forest Department. After planting, Community Forest user groups have to protect and maintain and manage their community forest plantation. Among the (28) CF, Kanyin Kone+ Kanyin Kone island(2 CF), Khar Chin, Oakpo Kwin Chaung(2 CF), Tebin Seik, and Wa Kone(2 CF) had done reforestation more than 100% according to the above table (6.6).

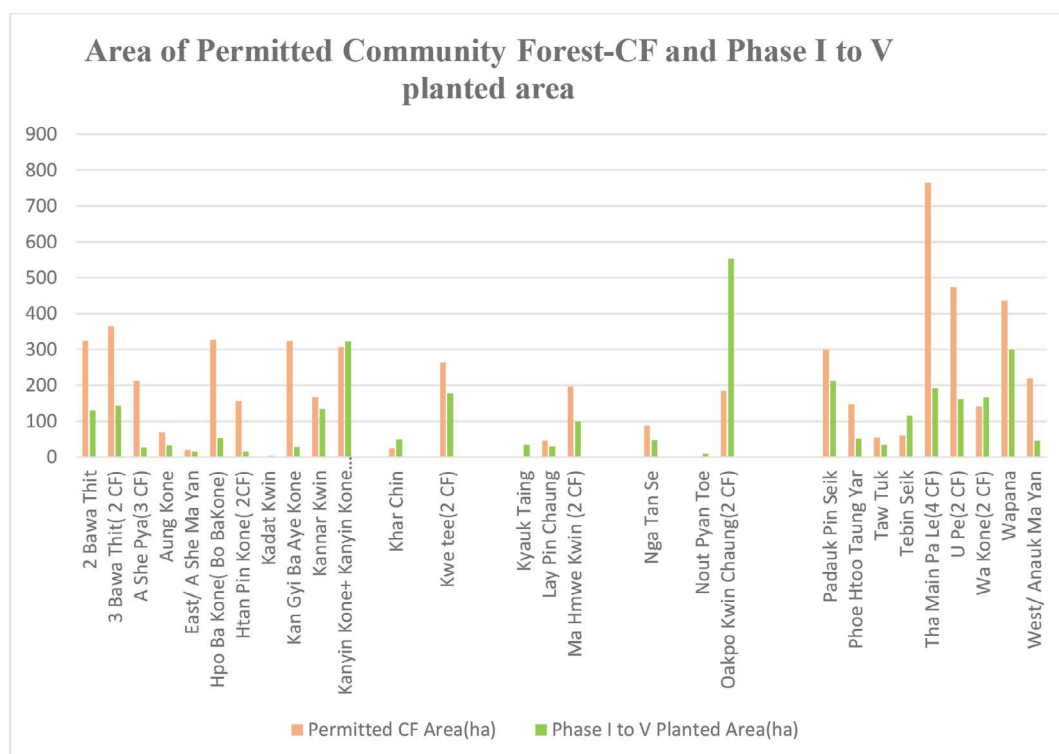
Mangrove Ecosystems Restoration and Community Development Project manager explained that some village like Wa Kone, Kywe Tee, Pa Dauk Pin Seik and 3 Ba Wa Thit village community forest user group cut the trees to harvest fuelwood, pole and post from their community forest. Mangrove reforestation team selected the gap and depleted mangrove forest and mangrove reforestation team helped for restoration that area.

However, some villages like Oakpho Kwin Chaung changed community forest land for rice cultivation, and production of salt by using sunshine. Area of Permitted Community Forest-CF and Phase I to V planted area at 28 Community forest is shown in the following table.

Table 6.7 Area of Permitted Community Forest-CF and Phase I to V planted area

Sr	Name of CF	Permitted CF Area(ha)	Phase I to V Planted Area(ha)	% of reforestation	Nearest GPS points
1	2 Bawa Thit	324	129	40	15.789066666667N95.38382E
2	3 Bawa Thit (2 CF)	364	142	39	15.789266666666N95.42047E
3	A She Pya (3 CF)	212	27	13	
4	Aung Kone	69	32	46	15.80038N95.35403E
5	East/ A She Ma Yan	19	16	85	15.81904N95.4485E *
6	Hpo Ba Kone (Bo BaKone)	327	53	16	15.8886N95.5021E
7	Htan Pin Kone (2CF)	155	16	10	15.74091N95.4361E

Sr	Name of CF	Permitted CF Area(ha)	Phase I to V Planted Area(ha)	% of reforestation	Nearest GPS points
8	Kadat Kwin		4		15.8047N95.47316E
9	Kan Gyi Ba Aye Kone	324	29	9	15.7623N95.295936E
10	Kannar Kwin	168	134	81	15.75N95.31667E
11	Kanyin Kone+ Kanyin Kone island (2 CF)	306	323	106	15.7862N95.43195E 15.80747N95.4685E
12	Khar Chin	25	49	197	15.47219 N 95.2618E 15.80747N95.4685E
13	Kwe tee(2 CF)	264	177	67	15.81111N95.4875E 15.79688N95.47261E
14	Kyauk Taing		34		
15	Lay Pin Chaung	45	30	67	15.79059N95.31757E
16	Ma Hmwe Kwin (2 CF)	197	99	50	15.77222N95.44444E 15.77552N95.43577E
17	Nga Tan Se	88	46	53	15.75N95.41667E 15.450N 95.250 E 15.76109N95.41685E
18	Nout Pyan Toe		9		Phase III Plantation
19	Oakpo Kwin Chaung (2 CF)	185	554	299	15.83838N95.40877E 15.82145N95.39708E 15.83333N95.43333E 15 50N 95 260 E
20	Padauk Pin Seik	300	212	71	15.77917N95.4E
21	Phoe Htoo Taung Yar	148	52	35	15.83879N95.46125E
22	Taw Tuk	54	34	62	15.82954N95.45797E
23	Tebin Seik	61	115	189	15.81108N95.43254E
24	Tha Main Pa Le(4 CF)	765	191	25	15.75484N95.29921E
25	U Pe(2 CF)	473	161	34	15.74363N95.39387E
26	Wa Kone(2 CF)	141	166	118	15.800225N95.4227E
27	Wapana	436	300	69	15.75361N95.36972E
28	West/ Anauk Ma Yan	220	45	21	15.79672N95.40365E
	Total	5670	3179	56	



6.3 Outcomes:

The changes, effects, or benefits that occur as a result of the outputs produced by the Mangrove Ecosystems Restoration and Community Development Project are;

6.3.1 Increased Forest cover at Pyindaye reserved forest.

According to the “Assessment of Land Cover Changes and the Causes of Mangrove Degradation in Pyindaye Reserved Forest, Ayeyarwady Delta, Myanmar”, written by Yan Naing Phyto, it was found that the forest areas in study area in 2019 has increased again compared to 2010 due to the reforestation and rehabilitation programs after striking the Cyclone Nargis in 2008. The forest cover in the Pyindaye Reserved Forest saw a significant increase, rising from 22.32% in 2010 to 26.75% in 2019. The average annual increase rate of forest was 2.33%. Over 7930 ha of shrub have been converted to forest due to reforestation program in this area. According to his findings, forest area has increased from 2010 to 2019 due to reforestation and rehabilitation programs of Forest Department, FREDa, MERN, RECOFTC, GEDA, ACP, etc. in Pyindaye reserve forest.

6.3.2 Increased number of trees, volume, CO₂ equivalent (CO₂ e), value of mangrove plantation at community forest

Evaluation team got the information from Ecosystem Conservation and Community Development Initiative (ECCDI), who stayed at the FRED A Oakpho camp and collected field data. Food and Agriculture Organization of the United Nations (FAO) and the Ecosystem Conservation and Community Development Initiative (ECCDI) collected field data in the designated community forests in Pyapon Township in Ayeyarwady Delta to conduct carbon accounting and estimation of carbon sequestration in (21) Mangrove CF. Soil carbon content (SOC) data were collected in the designated 21 CFs and analyzed at the Land Utilization Division of the Agriculture Department in Yangon. FAO, CDE and ECCDI combined team visited the CFs, met with the CFUGs and corrected the CF boundaries. FAO team developed Land Use maps based on manual digitizing using High Resolution Satellite Imagery. FAO, CDE and ECCDI combined team conducted GPS tracking and waypoints marking along ambiguous boundaries of the 21 CFs from 4th to 13th October 2023 with the participation of the concerned CFUGs. With technical support from FAO experts, they produced land use map of each CF with updated area based on manual digitizing using High Resolution Satellite Imagery. Forest inventory was conducted by three Inventory Crews from 1st November to 15th December 2023 in the 21 CFs designated by FAO. [5]

FREDA had ever done reforestation project at 12 CFs including Ah Shae Phyar, Bawa-Thit-3 CF, Ba Wa Thit-3 Cf, HTAN PIN KONE CF, Kanyin Kone CF, Kywe Te CF, Lay Pin Chaung CF, Ma Hmwe Kwin Cf, Ngar Dan Se CF, Te Pin Seik CF, Wah Kone CF, Wah Pa Na CF. According to their finding, it was learnt that one hectare of a plantation of community forest contain 1370 trees/ ha, and estimated average volume per hectare is 43m³/ha. It may vary depending on age of plantation, species, site quality, etc.

Table 6.8 Number of trees and volume in planted mangroves in the CF.

Sr	Name of CF	Plantation(ha)	Number of Trees (≥ 5 cm d)	Volume Per Hectare Meter ³	Volume Meter ³
1	Ah Shae Phyar	5.33	725	6.3	34
2	Bawa-Thit-3 CF (U Thein Han)	15.63	24,546	50.01	782
3	Ba Wa Thit-3 Cf (U Tin Win)	44.61	71,872	52.8	2,357
4	HTAN PIN KONE CF	16.59	1,844	3.005	50
5	Kanyin Kone CF	6.33	9,812	51.192	324
6	Kywe Te CF	24.73	9,892	29.26	724

Sr	Name of CF	Plantation(ha)	Number of Trees (≥ 5 cm d)	Volume Per Hectare Meter ³	Volume Meter ³
7	Lay Pin Chaung CF	44.89	68,582	46.581	2,091
8	Ma Hmwe Kwin Cf (U Myint Soe)	8.31	3,370	13.578	113
9	Ngar Dan Se CF	9.96	20,525	55.633	554
10	Te Pin Seik CF	17.86	44,650	67.516	1,206
11	Wah Kone CF	40.93	85,492	59.212	
	2,423				
12	Wah Pa Na CF	26.48	17,214	20.245	536
	12 CF total	261.65	358524	43	11194
	Average/ ha		1370		43

If we assume that the age of the plantation, species, site quality, and survival rate remain constant, it implies several things;

1. Age of the Plantation: The growth rate and maturity of the mangrove trees remain steady without being affected by natural disturbances or changes in land management practices.
2. Species: The specific species of mangroves being planted are the same, and no shifts to other species that might grow differently or sequester carbon at different rates are introduced.
3. Site Quality: The environmental conditions, such as soil fertility, water availability, and climate factors, remain optimal and consistent for mangrove growth. Any degradation or improvement in these conditions is not expected.
4. Survival Rate: The percentage of mangrove trees that survive after planting remains the same, with no increases in mortality due to disease, pests, or other external factors like human intervention.

However, the statement doesn't explicitly mention land use change or illegal fuelwood cutting, but it implicitly assumes that no such events occur. These factors are external influences that could significantly alter the survival rate and site quality over time. So, the assumption would also extend to:

- No land use change: There is no conversion of mangrove areas into agricultural land (like rice fields) or any other land use that reduces the forested area.
- No illegal fuelwood cutting: The mangrove forest is protected from illegal harvesting activities that could reduce the volume of biomass and disrupt the ecosystem.

The statement assumes not only the biological and environmental factors (age, species, site quality, survival rate) remain constant, but also that human-related activities like land use change and illegal logging do not negatively impact the plantation.

If we assume that the age of the plantation, species, site quality, and survival rate remain constant, the average volume of one hectare of mangrove plantation is 43 cubic meters. Therefore, the total volume for the 3,000 hectares of mangrove plantations established by FREDa, ACTMANG, and 28 CFUGs is estimated to be 129,000 cubic meters.

Evaluation team asked AI to estimate the value of 129000 meter³ in the carbon market, and AI answered as follow;

The value of 129,000 cubic meters (m³) of carbon in the carbon market depends on the type of carbon sequestration (e.g., forest carbon credits, direct air capture, etc.) and the market price of carbon, which fluctuates based on the region, market regulations, and the type of project.

To estimate the value of 129,000 m³ of carbon:

Convert cubic meters to CO₂ equivalent (CO₂e):

Typically, the carbon stored or avoided by trees or other ecosystems is measured in metric tons of CO₂e. CO₂ equivalent (CO₂e) is a standard unit used to measure and compare the impact of various greenhouse gases (GHGs) on global warming. Since different gases have different warming potentials, CO₂e expresses the impact of any greenhouse gas in terms of the amount of carbon dioxide (CO₂) that would cause the same level of warming.

For example, methane (CH₄) is a much more potent greenhouse gas than CO₂, with a higher Global Warming Potential (GWP) over a specific time period (usually 100 years). To express its impact in terms of CO₂e, you multiply the amount of methane emitted by its GWP value (which is around 28-36 times that of CO₂, depending on the timeframe).

CO₂e simplifies the comparison of emissions from different sources by converting them into a common unit, allowing us to more easily understand the overall effect on climate change.

In short, CO₂e enables us to express the global warming potential of all greenhouse gases in a unified metric.

Depending on the carbon content of the material and the type of carbon project, the amount of CO₂ per m³ will vary. For example, in the case of forests, 1 m³ of wood can store roughly 0.9 metric tons of CO₂ on average, but this can vary based on tree species, density, and age.

For this estimate, let's assume 0.9 metric tons of CO₂ per cubic meter:

$$129,000\text{m}^3 \times 0.9\text{tons CO}_2/\text{m}^3 = 116,100\text{metric tons CO}_2\text{e}$$

Mangrove forests store about 500 to 1,100 tons of carbon per hectare. 1,500,000 to 3,300,000 tons of carbon are stored in 3000 ha of mangrove forest.

Carbon price:

Carbon prices fluctuate significantly across markets. For example:

European Union Emissions Trading System (EU ETS) prices have ranged from €80–€100 per metric ton of CO₂.

Voluntary Carbon Markets often trade between \$10–\$50 per metric ton, depending on the quality and certification of the carbon credits.

Let's consider a mid-range estimate of \$30 per metric ton of CO₂e in a voluntary market:

$$116,100 \text{ metric tons CO}_2\text{e} \times 30 \$/\text{ton} = 3,483,000 \$$$

Estimated Value:

The estimated value of 129,000 cubic meters of carbon sequestration in the carbon market could be around \$3.48 million at \$30/ton CO₂e.

On the other hand, it is estimated that 1,500,000 to 3,300,000 tons of carbon are stored in 3000 ha of mangrove forest. This carbon storage includes both aboveground biomass (tree trunks, branches, and leaves) and belowground biomass (roots and soil). up to 75%, of the carbon in mangroves is stored in the soil beneath the trees, making them one of the most efficient carbon sinks in coastal ecosystems.

If 1,500,000 to 3,300,000 tons of carbon are stored in 3000 ha of mangrove forest, the value of this carbon in the carbon market could be estimated as follow;

To estimate the value of the carbon stored in a mangrove forest, we need to calculate the total carbon stored in terms of carbon credits and multiply it by the current market price of carbon. Here's a step-by-step process:

Step 1: Convert carbon stored to CO₂ equivalents (CO₂e)

Carbon stored is usually measured in tons of carbon (C), but carbon markets typically trade in terms of carbon dioxide equivalents (CO₂e).

- The molecular weight of CO₂ is 44, and the atomic weight of carbon is 12.
- To convert tons of carbon to tons of CO₂e, we multiply the carbon by $\frac{44}{12}$ (approximately 3.67).

Thus:

- For 1,500,000 tons of carbon: $1,500,000 \times 3.67 = 5,505,000$ tons of CO₂e
- For 3,300,000 tons of carbon: $3,300,000 \times 3.67 = 12,111,000$ tons of CO₂e

Step 2: Market price of carbon

The value of carbon credits fluctuates depending on the market. As of 2024, the price per ton of CO₂e ranges widely, from approximately \$5 to \$100 USD per ton, depending on the market (voluntary or compliance-based) and the region.

Step 3: Estimate the value

Let's use two different price ranges to calculate the potential value of the stored carbon:

1. At \$5 per ton:

- For 5,505,000 tons of CO₂e: $5,505,000 \times 5 = 27,525,000$ USD
- For 12,111,000 tons of CO₂e: $12,111,000 \times 5 = 60,555,000$ USD

2. At \$50 per ton:

- For 5,505,000 tons of CO₂e: $5,505,000 \times 50 = 275,250,000$ USD
- For 12,111,000 tons of CO₂e: $12,111,000 \times 50 = 605,550,000$ USD

3. At \$100 per ton:

- For 5,505,000 tons of CO₂e: $5,505,000 \times 100 = 550,500,000$ USD
- For 12,111,000 tons of CO₂e: $12,111,000 \times 100 = 1,211,100,000$ USD

Final Value Range:

- At \$5 per ton, the value of carbon stored in 3,000 ha of mangrove forest is estimated to be between \$27.5 million and \$60.6 million.
- At \$50 per ton, the value ranges from \$275.3 million to \$605.6 million.
- At \$100 per ton, the value could be between \$550.5 million and \$1.21 billion.

The actual market value will depend on the specific carbon market we are engaging with and the price per ton in that market.

6.3.3 Cost-Benefit Analysis

Evaluation team conducted a cost-benefit analysis to assess the economic efficiency of the reforestation efforts, taking into account both the costs of implementation and the benefits accrued in terms of ecosystem services and socio-economic gains.

The estimated value of 129,000 cubic meters of carbon sequestration in the carbon market could be around \$3.48 million, and the inputs of ACTMANG was \$ 1,190,500. Profit could be estimated 3.48 million minus inputs \$ 1,190,500, is equal to US\$ 2,289,500.

If the inputs of mangrove reforestation was \$ 1,190,500 in 3000 ha of mangrove plantation, the value of mangrove plantation is estimated as follow; and what the benefit or profit might be?

- At \$5 per ton, the value of carbon stored in 3,000 ha of mangrove forest is estimated to be between \$27.5 million and \$60.6 million.
- At \$50 per ton, the value ranges from \$275.3 million to \$605.6 million.
- At \$100 per ton, the value could be between \$550.5 million and \$1.21 billion.

To estimate the benefit or profit from the Mangrove Ecosystems Restoration and Community Development Project, we need to subtract the inputs (costs) from the estimated value of carbon storage at different price points. Here's a step-by-step breakdown:

Inputs (Costs)

The total cost (input) for reforesting 3,000 hectares of mangroves is \$1,190,500.

Carbon Market Scenarios

The potential value of carbon stored in 3,000 hectares of mangrove forest, as estimated earlier, varies depending on the carbon price per ton. Let's calculate the profit under different scenarios:

1. At \$5 per ton of CO₂e

- Estimated value: \$27.5 million to \$60.6 million
- Profit calculation:
 - o Lower range: $27,500,000 - 1,190,500 = 26,309,500$ USD
 - o Upper range: $60,600,000 - 1,190,500 = 59,409,500$ USD
 - o Profit range: \$26.3 million to \$59.4 million

2. At \$50 per ton of CO₂e

- Estimated value: \$275.3 million to \$605.6 million
- Profit calculation:

- o Lower range: $275,300,000 - 1,190,500 = 274,109,500$ USD $275,300,000 - 1,190,500 = 274,109,500$ \, \ {USD} $275,300,000 - 1,190,500 = 274,109,500$ USD
- o Upper range: $605,600,000 - 1,190,500 = 604,409,500$ USD $605,600,000 - 1,190,500 = 604,409,500$ \, \ {USD} $605,600,000 - 1,190,500 = 604,409,500$ USD
- o Profit range: \$274.1 million to \$604.4 million

3. At \$100 per ton of CO₂e

- Estimated value: \$550.5 million to \$1.21 billion
- Profit calculation:
 - o Lower range: $550,500,000 - 1,190,500 = 549,309,500$ USD $550,500,000 - 1,190,500 = 549,309,500$ \, \ {USD} $550,500,000 - 1,190,500 = 549,309,500$ USD
 - o Upper range: $1,210,000,000 - 1,190,500 = 1,208,809,500$ USD $1,210,000,000 - 1,190,500 = 1,208,809,500$ \, \ {USD} $1,210,000,000 - 1,190,500 = 1,208,809,500$ USD
 - o Profit range: \$549.3 million to \$1.21 billion

Summary of Potential Profits:

- At \$5 per ton: Profit between \$26.3 million and \$59.4 million
- At \$50 per ton: Profit between \$274.1 million and \$604.4 million
- At \$100 per ton: Profit between \$549.3 million and \$1.21 billion

The benefit or profit would depend heavily on the price of carbon credits in the market, but even at the lowest price of \$5 per ton, the potential profit is substantial.

6.4 Impacts:

The long-term, overarching effects or consequences of the Mangrove Ecosystems Restoration and Community Development Project's outcomes on individuals, communities, systems, or the environment need to be observed in the consequence year. Impacts reflect the ultimate goals or intended benefits of the Mangrove Ecosystems Restoration and Community Development Project and often extend beyond the project's immediate scope or timeframe. They represent the lasting changes or improvements that result from the Mangrove Ecosystems Restoration and Community Development Project's interventions.

Evaluation team found plastic bags which were used for raising seedling for mangrove reforestation. 1200 seedling were raised at nursery and transplanted to plantation site. Plastic bags size was 7 inches X 3 inches. These plastic bags were discarded in the field. Mangrove Ecosystems Restoration and Community Development Project manager told that six lb of plastic containers, polyethene bags is required per acre to raise 1200 seedling per acre. Mangrove Ecosystems Restoration and Community Development Project used 47523 Lbs for 7920.5 acre(3199.46 ha) of mangrove plantation established during last 25 years.

6.4.1 Plastic Pollution and Its Pathway to the Environment

6.4.1.1. Air Pollution from Microplastics:

When plastic is discarded on land, it doesn't simply disappear. Over time, sunlight, wind, and other environmental factors break the larger pieces of plastic into smaller particles called microplastics (tiny plastic fragments smaller than 5 millimeters). These microplastics are so lightweight that they can be lifted into the air by wind or mechanical disturbances.

Airborne microplastics: Once airborne, these particles mix with dust and other atmospheric particles. This means they can be inhaled by humans and animals, posing potential health risks. In the atmosphere, they travel across vast distances and can accumulate in regions far from their original source.

Transport through rain: Eventually, many of these microplastics return to the ground through rainfall. Rain droplets can capture airborne microplastic particles and wash them into nearby streams, rivers, and eventually the oceans. Thus, plastic pollution can spread to aquatic ecosystems even from areas far from coastlines.

6.4.1.2. Water Pollution from Plastics:

Plastic bags and large debris: Plastic bags and other larger plastic materials discarded on land often end up in waterways. Rain and stormwater runoff carry these plastics into streams, rivers, and eventually into the sea. Once in the water, plastic waste poses immediate dangers to wildlife, such as marine animals becoming entangled or ingesting the plastic, mistaking it for food.

Breakdown into microplastics in water: In aquatic environments, large plastic items further degrade into smaller particles due to UV radiation, waves, and physical wear. These microplastics are particularly problematic because they are not easily filtered or removed from the water. As they accumulate in the ocean, they can impact marine organisms at various levels of the food chain.

6.4.1.3. Impact of Microplastics on Marine Life:

Ingestion by aquatic organisms: Microplastics can be ingested by a wide range of marine life, from the smallest plankton to larger fish, birds, and mammals. Once consumed, microplastics can block the digestive systems of animals, leading to malnutrition, and in some cases, death. Moreover, plastics often absorb harmful chemicals from the water, which can accumulate in the bodies of the organisms that ingest them, leading to toxic effects.

Bioaccumulation: As small fish and other organisms consume microplastics, these particles can accumulate up the food chain. Larger predators, including humans,

who eat seafood, may also ingest microplastics that have accumulated in marine animals.

6.4.1.4. Nanoplastics in the Food Chain:

Nano plastics are even smaller than microplastics, typically defined as plastic particles that are less than 1 micrometer in size. These tiny particles are often not visible to the naked eye but are present in aquatic environments due to the continuous breakdown of plastics.

Presence in seafood: Nano plastics can pass through the biological membranes of aquatic animals and accumulate in their tissues and organs. Studies suggest that nano plastics can be found in fish, crustaceans, and other sea creatures that humans consume. This introduces the possibility of nano plastic exposure in humans through seafood consumption.

6.4.1.5. Salt Contamination with Nano plastics:

Salt production and contamination: Sea salt, which is derived from the evaporation of seawater, can also contain traces of microplastics and nano plastics. As plastic particles in the ocean accumulate, they can end up in the water used to produce salt, leading to contamination. Research has found microplastics in various commercial sea salt products worldwide, raising concerns about the ingestion of these particles by people through everyday food products.

The pollution caused by discarded plastic on land and in water is a global concern. Plastics break down into microplastics, which not only pollute the air and water but also enter the food chain, posing health risks to both marine life and humans. As plastics continue to accumulate in the environment, the long-term consequences, especially concerning nano plastic contamination in food products like sea salt, are still being studied but are likely to increase as plastic waste management continues to be a challenge. In short, discarding plastic irresponsibly on land sets off a chain reaction of environmental contamination, eventually affecting the air we breathe, the water we drink, and the food we eat. Reducing plastic use and improving waste management practices are crucial to mitigating these effects.

6.4.2 Ecological Impacts:

- **Increased Forest Cover:**

The project has successfully reforested 3,000 hectares, contributing to the restoration of mangrove ecosystems.

- **Enhanced Biodiversity:**
Mangroves provide critical habitats for various marine and terrestrial species, supporting fisheries and biodiversity conservation.
- **Improved Ecosystem Services:**
Reforestation has strengthened coastal protection against erosion, storm surges, and flooding while improving water quality through filtration.

6.4.3 Socio-Economic Impacts:

- **Livelihood Support for CFUGs:**
The project actively engaged 28 Community Forest User Groups (CFUGs), enhancing their roles in sustainable forest management. Livelihood opportunities, such as fishing, aquaculture, and non-timber forest product collection, have been improved.
- **Alternative Income Generation:**
By fostering community participation, the project promoted sustainable practices and alternative livelihoods, reducing reliance on mangrove harvesting.
- **Capacity Building:**
Training programs for CFUGs improved local skills in mangrove planting, monitoring, and sustainable resource use.

6.4.4 Climate-Related Impacts:

- **Carbon Sequestration:**
 - o The reforested mangroves are estimated to store **129,000 cubic meters** of biomass, equating to a significant amount of sequestered carbon.
 - o This aligns with Myanmar's Nationally Determined Contributions (NDCs) for climate change mitigation.
- **Mitigation of Climate Impacts:**
Mangroves play a vital role in mitigating the effects of climate change by acting as natural carbon sinks and reducing greenhouse gas concentrations.

Economic Valuation:

- **Carbon Market Potential:**
 - o The project's carbon sequestration is valued between **\$27.5 million and \$1.21 billion**, depending on carbon pricing. This highlights the economic viability of mangrove restoration.
 - o Participation in carbon trading markets can further enhance financial returns for local communities.

6.4.5. Social and Community Impacts:

- **Community Empowerment:**
The project fostered inclusivity by actively involving local stakeholders in decision-making and implementation.
- **Improved Resilience:**
Restored mangroves provide natural protection against climate-related disasters, improving the resilience of coastal communities.
- **Support for Indigenous Knowledge:**
Integration of traditional ecological knowledge with modern restoration practices enriched the effectiveness and sustainability of the project.

Challenges Addressed:

- Combated illegal cutting of mangroves for fuelwood and shrimp processing.
- Reduced pressures from unsustainable land-use changes for agriculture and salt production.
- Enhanced awareness about the ecological and economic value of mangroves, discouraging exploitative practices.

The FRED A and ACTMANG Mangrove Ecosystems Restoration and Community Development Project is a model of integrated, community-driven ecosystem restoration. Its ecological, socio-economic, and climate-related benefits underscore its importance in achieving sustainable development goals while addressing climate challenges and improving local livelihoods.

6.5 The Most Significant Change

6.5.1 Over the past 25 years, the Mangrove Ecosystems Restoration and Community Development Project has made significant achievements in revitalizing and conserving crucial mangrove ecosystems. It has become evident that while commendable progress has been achieved, certain areas require improvement for the forthcoming sixth phase. The assessment highlights the necessity for enhanced community engagement and participation, ensuring sustainable practices are ingrained within local populations. Furthermore, technological advancements should be integrated to streamline monitoring and data collection processes, facilitating better-informed decision-making. Collaborative efforts with governmental bodies and environmental organizations should be intensified to broaden the project's scope and amplify its impact. By embracing these changes, the sixth phase of the Mangrove Ecosystems Restoration and Community Development Project aims to address past shortcomings effectively and pave the way for even greater success in conserving these vital coastal ecosystems.

6.5.2 Mangrove Ecosystems Restoration and Community Development Projects involve restoring and replanting mangrove forests, which are critical ecosystems found along coastlines in tropical and subtropical regions. Here are some of the most significant changes and impacts of Mangrove Ecosystems Restoration and Community Development Projects

Significant Changes:

Increased Mangrove Coverage: The primary goal of reforestation projects is to increase the extent of mangrove forests in areas where they have been degraded or lost due to human activities such as deforestation, aquaculture, and urban development.

Improved Biodiversity: Reforestation efforts can lead to the restoration of habitat for various species of plants and animals that depend on mangroves for survival. This can include fish, crustaceans, birds, and other wildlife.

Erosion Control: Mangrove roots stabilize coastal sediments and protect shorelines from erosion caused by waves and storms. Reforestation projects help to mitigate the effects of coastal erosion and protect adjacent communities from flooding and other natural disasters.

Carbon Sequestration: Mangrove forests are highly effective at sequestering carbon dioxide from the atmosphere, helping to mitigate climate change. Reforestation efforts contribute to the capture and storage of carbon in mangrove biomass and sediments.

Water Quality Improvement: Mangroves act as natural filters, trapping sediments and pollutants from runoff before they enter coastal waters. Restoring mangrove forests can improve water quality and support the health of marine ecosystems.

Impacts:

Ecological Benefits: Mangrove Ecosystems Restoration and Community Development Projects enhance the resilience and productivity of coastal ecosystems, providing valuable ecosystem services such as fishery support, nutrient cycling, and coastal protection.

Socio-economic Benefits: Healthy mangrove forests support the livelihoods of millions of people worldwide who depend on them for fishing, tourism, and other economic activities. Reforestation projects can create employment opportunities and improve the well-being of local communities.

Climate Change Mitigation: By sequestering carbon dioxide and reducing greenhouse gas emissions, mangrove reforestation contributes to global efforts to combat climate change and achieve carbon neutrality.

Biodiversity Conservation: Restoring mangrove habitats helps to conserve biodiversity by providing essential habitat for a wide range of plant and animal species, including many endangered and commercially important species.

Community Resilience: Mangrove Ecosystems Restoration and Community Development Projects enhance the resilience of coastal communities to climate change impacts such as sea-level rise, storm surges, and extreme weather events by providing natural buffers and protective barriers against coastal hazards.

Overall, Mangrove Ecosystems Restoration and Community Development Projects offer a range of environmental, social, and economic benefits, making them a valuable tool for sustainable coastal management and conservation.

6.5.3 Most Significant Change

Table 6.9 Most Significant Change in the 28 villages and Community Forest during time frame of 1st phase to 5th Phase of Mangrove Ecosystems Restoration and Community Development Project.

Sr.	Changes	Causes of the Change/Project Activity	Beneficiaries
1	Land tenure and use of forest resources for 30 years	Establishment of Community Forestry CF (5670 ha)	1435 CFUG members
2	Over 7930 ha of shrub have been converted to forest due to reforestation program in this area. Forest area has increased from 2010 to 2019	Establishment of (3179) ha of mangrove plantation, regeneration improvement felling, gap planting at the Community Forest in Pyindaye reserved forest. Mangrove Ecosystems Restoration and Community Development Project implemented by Forest Department, FREDA, ACTMANG, RECOFTC, MERN, BANCA, private plantation owners.	1435CFUG members
3	Improved basic needs (food) for the families	Improved basic needs (food) for the families	CFUG members
4	Increased production and income from crab, shrimp, Blood Cockle/ blood clam (<i>Tegillarca granosa</i>): NTFPs	Establishment of CF	CFUG members

Sr.	Changes	Causes of the Change/Project Activity	Beneficiaries
5	Right for practicing agroforestry	Establishment of CF	CFUG members
6	Attained knowledge of CF establishment	CF establishment Training	CFUG members
7	Biodiversity	Restoring mangrove forest by planting with <i>Bruguiera</i> (Byu), <i>Sonneratia apetala</i> (Kanbala), <i>Avicennia officinalis</i> (Thame Gyi), <i>Avicennia marina</i> (Thame Phyu), <i>Xylocarpus moluccensis</i> (Kyana), <i>Aegialitis rotundifolia</i> (Sarthar), <i>Lumnitzera racemose</i> (Aeik mathwe), <i>Heritiera fomes</i> (Kana-zo), <i>Ceriops decandra</i> (Mada-ma) etc in the area of community forest.	All
8	Forests became more green	Conservation of natural forest through CF	All
9	Watercourse buffers along the river and stream are covered with mangrove trees. Restored mangrove forest along the watercourse buffer mitigate the effects of coastal erosion and protect adjacent communities from flooding and other natural disasters.	Restoration and rehabilitation of mangrove forest along the water course buffer. Mangrove roots stabilize coastal sediments and protect shorelines from erosion caused by waves and storms.	Agricultural land, rice field, residential area of all local community at watercourse buffers.
10	Supply fuelwood demand of Kyarr phong 'tiger mouth net'. for sea fishing, dry prawn processing, cooking food	Mangrove Ecosystems Restoration and Community Development Project implemented by Forest Department, FREDA, ACTMANG, RECOFTC, MERN, BANCA, private plantation owners.	Kyarr phong 'tiger mouth net'. for sea fishing, dry prawn processing, cooking food at community households

Sr.	Changes	Causes of the Change/Project Activity	Beneficiaries
11	1,500,000 to 3,300,000 tons of carbon are stored in 3000 ha of mangrove forest. This carbon storage includes both aboveground biomass (tree trunks, branches, and leaves) and belowground biomass (roots and soil). up to 75%, of the carbon in mangroves is stored in the soil beneath the trees, making them one of the most efficient carbon sinks in coastal ecosystems.	Establishment of 2167 ha of Community Forest plantation, 1026 ha of RIF, enrichment planting. Conservation of mangrove forest.	Stakeholders who are responsible for burning of coal, oil, and natural gas for electricity and heat. Combustion of fossil fuels for transportation, such as cars, trucks, ships, airplanes, and trains running on gasoline, diesel, or aviation fuel. Production of Cement, steelmaking, and other industrial processes. Production of plastics and other chemicals Cutting down forests, particularly tropical rainforests, and mangroves, for agriculture, urban development, or logging. Cultivation and breeding of agriculture and livestock which produce methane and nitrous oxide. Emissions of methane from livestock, rice paddies, and the use of synthetic fertilizers. Production of methane from organic waste in landfills, as it decomposes anaerobically. Emission due to the energy use in buildings, especially in heating, air conditioning, and lighting. Large industrialized nations such as China, the United States, India, and the European Union are among the largest contributors to carbon emissions.

7. SWOT (Strengths, Weakness, Opportunity and Threats) Analysis

The evaluation aims to identify what aspects of the project have been successful and what areas may require improvement, such as project management, stakeholder engagement, or ecological outcomes. Identifying strengths, weaknesses, opportunities, and threats (SWOT analysis) is crucial for evaluating the effectiveness and sustainability of a Mangrove Ecosystems Restoration and Community Development Project.

7.1 Strengths

7.1.1 Species Diversity.

The availability of diverse mangrove species in the areas can be identified as “strength” as it enable the mangrove reforestation activities to its success. Evaluation team asked to the community forest user group member to collect information on the present and absent of mangrove tree species, which are found in the community forest area of Pyindaye reserved forest, Pyarpon township, Ayeyarwaddy region. According to the answer of four villagers from Pyindaye reserved forest, (24) mangrove species are abundant, (59) mangrove species are rare, and 15 mangrove species are not found in that area. List of abundant species, rare species and the mangrove plant species which were not found in Pyindaye reserved forest are presented in Attachment 9.

Evaluation team recorded abundant species, which include *Acanthus ilicifolius* L., *Acanthus volubilis* Wall., *Acrostichum aureum* Linne, *Avicennia officinalis* L., *Brownlowia tersa* (L.) Kosterm, *Bruguiera gymnorhiza* (L.) Lamk, *Bruguiera sexangula* (Lour.) Poir., *Dalbergia pinnata* Lour. *Dalbergia spinosa* Roxb., *Dendrobium moschatum*, *Derris scandens* (Aubl.) Pittier, *Derris trifoliata* Lour., *Excoecaria agallocha* L., *Finlaysonia maritima* Backer ex k.lleyne, *Hibiscus tiliaceus* L., *Hygrophila spinosa* T. Anders, *Hygrophila obovata* Wight, *Imperata cylindrica* (L.) P. Beauv., *Ipomea biloba*, *Leptochloa filiformis* (Lam.) P. Beauv, *Mucuna gigantean* DC., *Nypa fruticans* (Thumb.) Wurmb., *Phoenix paludosa* Roxb., *Polygonum chinense*

Evaluation team recorded rare (59) species, which include *Avicennia alba* Blume, *Acrostichum speciosum* Willd., *Acanthus ebracteatus* Vahl, *Aegialitis rotundifolia* Roxb., *Aegiceras corniculatum* (L.) Blanco, *Amoora cucullata* (Roxb), *Anamirta paniculata*, *Avicennia marina* (Forssk.) Vierh., *Azima samentosa*, *Barringtonia racemosa* (L.) Spreng., *Bruguiera cylindrica* (L) Bl., *Caesal pinia bonduc* (L.) Roxb. *Caesalpinia crista* L., *Calamus arborescens* Griff., *Calycopteris floribunda*, *Calptrpis gigantea*, *Cerbera odollam* Gaertn., *Ceryota urens*, *Ceriops decandra* (Griff.) Ding Hou, *Ceriops tagal* (Perr.) C.B Robinson, *Clerodendrum inerme* (L.) Gaertn, *Cordia cochinchinesis*, *Crinum asiaticum* L., *Cynometra ramiflora* L., *Diospyros embryopteris*, *Diospyros ferrea*, *Dolichandrone spathacea* (l.f.) K.Schum., *Erythrina indica*, *Eupatorium cannabinum* L., *Eupatorium odoratum* L., *Flagellaria indica* L., *Heritiera fomes* Buch. Ham., *Heritiera littoralis* Dryand, *Intsia bijuga* (Colebr.) Kuntze. *Ipomoea maxima* (L.f) Don ex Sweet, *Ipomoea tuba* (Schlecht.) G.Don., *Kandelia candel* (L.) Druce, *Lumnitzera racemosa*, *Merope angulata* (Willd.) Swingle, *Mussaenda macrophylla*, *Oncosperma filamentosa*, *Pandanus foetidus* Roxb., *Phragmites karka* (Retz.) Trin. ex Steud, *Pluchea indica* (L.) Less.. *Pongamia pinnata* (L.) Pierre, *Premna integrifolia* Lam., *Rhizophora apiculata* BL., *Rhizophora mucronata* Lamk., *Sapium indicum*, *Sarcolobus globosus* Wall., *Sonneratia alba* J. Smith, *Sonneratia apetala* Buch. Ham., *Sonneratia caseolaris* (L.) Engl., *Sonneratia griffithii* Kurz., *Stenochlaena palustris* (Burm.) Bedd., *Vitis auriculata*, *Vitex ovsta*, *Xylocarpus granatum* Konig, *Xylocarpus moluccensis* (Lamk) M.Roem.

However, evaluation team and community forest user group did not find (15) species in Pyindaye Reserved Forest. The fifteen species which are not found in Pyindaye reserved forest are *Ardisia litoralis*, *Avicennia lanata* Ridley, *Bruguiera harnesii*, *Bruguiera parviflora* (Roxb.) W. & A. ex Griff, *Combretum trifoliatum*, *Dalbergia volubilis* Roxburgh, *Diospyros maritima*, *Ficus obtusifolia*, *Lumnitzera littorea*, *Pandanus odoratissinus*, *Salacia prinoidies* DC. *S. chinensis* L., *Sarcolobus carinatus* Wall., *Sesuvium portulacastrum* (L.) L., *Stachytarpheta jamaicensis*, *Thespesia populnea*

7.1.2 Carbon Sequestration

These mangroves sequestering carbon dioxide and mitigating climate change. FREDA established more than 3000 ha of Community Forest plantation at gap, and Regeneration Improvement Felling with the financial support of ACTMANG. This carbon sequestration by the 3,000 ha of mangrove reforestation by this project can also be identified as “strength” because it mitigate the carbon emission and also adapt with the changing climate for local people. Mangrove forests store about 500 to 1,100 tons of carbon per hectare. 1,500,000 to 3,300,000 tons of carbon are stored in 3000 ha of mangrove forest. This carbon storage includes both aboveground biomass (tree trunks, branches, and leaves) and belowground biomass (roots and soil). Up to 75%, of the carbon in mangroves is stored

in the soil beneath the trees, making them one of the most efficient carbon sinks in coastal ecosystems.

7.1.3 Watercourse buffer Protection

Most of the river and stream bank are covered with mangrove forest in observed area. Mangrove forest established by FREDa and ACTMANG act as natural buffers against coastal erosion, river and stream bank erosion, storm surges, and tsunamis.

7.1.4 Community Engagement

Community forest user group members engaged in project planning, implementation, and monitoring, and fostering ownership and long-term stewardship. Under the idea of community forestry, local communities play an important role in forest use and management of surrounding forests and their resources. Before starting a community forestry project, ACTMANG discuss it with the Forest Department. Since most mangrove forest areas are managed by the Forest Department, the department give permission to local communities to use and manage forests and resources for a term of 30 years. This is an incentive for participation in community forestry. Once the local community gets permission, they have the responsibility to manage and use the forests and resources by themselves properly. This idea encourages local communities to conduct community forestry. Mangrove species have been planted successfully, because all of those were conducted by users' groups consisting of villagers.

7.1.5 Stakeholder Partnerships

Mangrove Ecosystems Restoration and Community Development Project promoted partnerships with government agencies such as Ministry of Natural Resource and Environmental Conservation- MONREC, Ministry of Home Affairs, Union Registration Committee, Ayeyarwaddy region government, Forest Department (Director General Office, Ayeyarwaddy region FD, Myaung Mya District FD, Pyapon township FD), local NGOs such as MERN, RECOFTC, Andaman Capital Partners-ACP, GEDA, Network Activities Group – Wetland Alliance, Myanmar Forest Association-MFA, *Biodiversity and Nature Conservation Association (BANCA)*, INGOs such as ACTMANG, UNDP, UN Habitat, FAO, DKH, EED, etc, leveraging resources and expertise for project success. ACTMANG is a non-profit organization, they do not seek to profit from this Mangrove Ecosystems Restoration and Community Development Project. Moreover, Tokio Marine also does not seek to profit from the project and refuses carbon business proposals from companies in Japan.

7.2 Weaknesses

7.2.1 Site Selection

Mangrove Ecosystems Restoration and Community Development Project implementation team have constraints in site selection. Pyindaye reserved forest is under the management of Forest Department. However, it has limited sites due to land use conflicts. Mangrove Ecosystems Restoration and Community Development Project sites were selected at degraded and depleted area of community forest such as abandoned rice field, degraded mangrove forest such as *Nypa fruticans* (Thumb.) Wurmb, *Phoenix paludosa* Roxb, *Acanthus ebracteatus* Vahl, *Acanthus ilicifolius* L. *Acanthus volubilis* Wall., *Acrostichum aureum* Linne, *Acrostichum speciosum* Willd. It seems that many organizations are providing support for reforestation, making it unclear which areas have been reforested with the support of which organization. In particular, the boundaries of old reforestation areas, community forest area appear to be unclear and incorrect. Mangrove Ecosystems Restoration and Community Development Project sites were selected in community forest areas, such as abandoned rice fields. However, areas such as encroached rice fields, village settlements, sun-dried salt production sites, and fish or shrimp breeding ponds within mangrove forest regions were not selected for restoration. This decision was made to avoid potential land-use conflicts or further encroachment, which could jeopardize the success of the reforestation project.

7.2.2 Seedling Survival Rates

Regarding this issue, there are three main factors which downgrade survival rate. And they are :

- (1) Leaf defoliator insect that feeds on the leaves of *Avicennia officinalis* particularly in young seedlings and in the *Avicennia officinalis* plantation.
- (2) The ghost crab (*Ocypode* spp.), known for its opportunistic feeding behavior, often targets the fruits and the base of the stem of young seedlings of *Avicennia officinalis*.
- (3) Strong tidal wave can carry away seeds which were directly sown at mangrove forest plantation site.

7.2.3 Funding Constraints

Mangrove Ecosystems Restoration and Community Development Project implementation team of FRED A have to use the limited budget, due to fixed exchange rate which were remitted to banks and need to adjust for the higher cost of project activities.

7.2.4 Technical Capacity

Technical expertise and resources for implementing reforestation techniques are available since FREDa and ACTMANG have many experiences in reforestation at mangrove forest. However, it is a big task to carry and transport seedling from mangrove nursery to plantation site under muddy condition. FREDa need to reduce the risk of plastic pollution from mangrove seedling transplanting activities and protect both the air and water quality in and around the mangrove forest. FREDa need to introduce the use of biodegradable seedling container, or direct seed sowing technique to reduce the use of plastic container for seedling raising. Evaluation team found plastic bags which were used for raising seedling for mangrove reforestation. 1200 seedling were raised at nursery and transplanted to plantation site. Plastic bags size was 7 inches X 3 inches. These plastic bags were discarded in the field. Mangrove Ecosystems Restoration and Community Development Project manager told that six lbs. of plastic containers, polyethene bags is required per acre to raise 1200 seedling per acre. Mangrove Ecosystems Restoration and Community Development Project used 47523 Lbs. for 7920.5 acre (3199.46 ha) of mangrove plantation established during last 25 years. The risk of plastic pollution from the use of plastic container for mangrove seedling raising and transplanting activities was the weakness in reforestation project. FREDa need to protect both the air and water quality in and around the mangrove forest for the use of plastic container, polythene bags, etc.

7.2.5 Monitoring and Evaluation

Weaknesses in monitoring and evaluation systems include limited data availability or capacity for tracking project outcomes and impacts. Some old data were difficult to collect. For example, list of plantations for each community forests and location map of plantation and regeneration improvement felling were still need to be collected until end of September, 2024.

7.3 Opportunity

- 7.3.1** FREDa got the funding opportunities from ACTMANG to implement the Mangrove Ecosystems Restoration and Community Development Project from phase one to phase six, since 1999.
- 7.3.2** FREDa got the funding opportunities from ACP in 2023 and 2024. The FREDa/ACP Mangrove Reforestation Project (Andaman Blue Pilot Project) is funded by ACP. It is situated in Pyindaye reserved forest, Pyapone District, Ayeyarwady Region. The project involves mangrove plantations in forest areas owned by local community groups and is considered an establishment business. In total of 300

acres of mangrove plantations were established and cultivated in cooperation with six forest user groups in the rainy season of 2023. The project spans from January 1, 2023, to December 31, 2023. Moreover, FREDA got the funding opportunity from ACP for 2024 reforestation. *Avicennia officinalis* and *Bruguiera sexangula* seedling will be transplanted and maintained at the 500 acre of community forest in Pyindaye reserved forest between first February 2024 to 31 January, 2025.

7.3.3 FREDA got the funding opportunities from Diakonie Katastrophenhilfe (DKH) of Germany and implemented the project on “Rehabilitation and disaster preparedness in Nargis affected areas of Ayeyarwady Region, Myanmar through sustainable landuse and renewable energy. This project was implemented in Ayeyarwady Region for 2 years from 1.1.2009 to 31.12.2010. The project budget was USD 230,720. Under the project, formation of wind break forest plantation, income generating with bee-keeping, distribution of fruit tree seedlings, introduction of renewable energy such as rice husk gasifiers, solar and wind energy for lighting, and testing oil seeds, were implemented during the project period.

7.3.4 FREDA got the funding opportunities from Myanmar Environmental Rehabilitation Network (MERN) to implement the project on “Mangrove reforestation and community forestry in Hpo Oo San village, Tebinseik village tract, Pyapon township, Ayeyarwady Region for one year from 1st April 2011 to 31st March 2012. The project budget was FEC 20,000. The main objective was to improve the environmental condition through mangrove reforestation and hence to provide better livelihood of the rural people living in the target area . Under the project, about 60 acres (24 ha) of community forest plantation was established near Hpo Oo San village with the active participation of 23 user’s groups of the target village . The survival percentage of that plantation counted in December, 2012 was 80.6% and hence it was successfully completed.

7.3.5 FREDA got the funding opportunities from Diakonie Katastrophenhilfe (DKH) of Germany to implement the project on “Disaster preparedness and rehabilitation measures for remote villages in Ayeyarwady Delta.” The project was implemented in Ayeyarwady Region for 2 years from 1st January 2011 to 31st December 2012. The project budget was Euro 205,479. The main objective was to provide some appropriate development activities as disaster preparedness and rehabilitation measures in remote and poor villages which are prone to natural disaster and more vulnerable in Ayeyarwady Region. Under the project, construction of school-cum-cyclone shelter (SCCS), construction of rural housing, village electrification with rice husk gasifier, establishment of village wood-lots, distribution of earthen pots for storage of drinking water, distribution of furniture for village schools and testing

of coconut oil as alternative energy were implemented during the project.

- 7.3.6** FREDa got the funding opportunities from Evangelischer Entwicklungsdienst EED of Germany to implement the project on “Disaster risk reduction and sustainable land use.” The project has been in Ayeyarwady Region and Kachin State for a period on years from 1st October 2010 to 30th September, 2013 . The project budget was Euro 310,000. The main objective was to conserve the natural forests and establish forest plantation for protection against natural disaster and to improve the income generation of the rural population in the target areas. Under the project, formation of green belt plantation along the coastal areas, community forest conservation in Ayeyarwady delta, distribution of fruit tree seedlings to local people, introduction of System for Rice Intensification (SRI), rain forest conservation for 540 ha. and 15 mini hydro power plants constructed in Kachin State during the project period.
- 7.3.7** FREDa got the funding opportunities from Network Activities Group – Wetland Alliance to implement the project on “Small scale Aqua-forestry to be developed in mangrove reforestation area, Ayeyarwady Delta”. This project has been implemented in Pyapon Township, Ayeyarwady delta for two years from 31st July 2012 to 31st December 2013. The project budget is about USD 61,744. The main objective is to introduce the Aqua-forestry practice in some poor villages for increasing additional income while conserving community forest nearby. Under the project, preparation of sites and fencing, construction of ponds for fishery and crab breeding, supporting for aqua seeds and feeding, provision of technical training and demonstration are done in the target villages in Pyapon Township.
- 7.3.8** FREDa got the funding opportunities from (DKH/Bftw) to implement the project on “Climate Change Adaptation in Ayeyarwady Delta”. The project Partner and the Financing enter into the agreement on 27-12-2013 with the Common objective of bringing the protestant Development Service financed totaling Euro (894,880) for the period (1-1-2014) to (31-3-2018) of (51) months, implementing the following (6) main activities. Construction of school-cum-Cyclone Shelter = 8 nos. Embankment Construction for preventing bank erosion near villagers = 8 places. Construction of Rain water harvesting ground tanks = 19 nos. Introduction of water Desalination by solar systems: -for villages 8 -for sccs 8 =16 sites. Furniture’s for SCCS, (Bench & Desk) 300 sets, training chairs 50 blackboard etc = 9 SCCS. Community Training on DRR = 8 times.
- 7.3.9** FREDa got the funding opportunities from Bread for the world, to implement the project on “Disaster Risk Reduction and Sustainable land Use- in Ayeyarwady Region.” Protestant Agency for Diakone and Development for Bread for the world- Protestant Development Service granted up to Euro(370,000) and project partner’s/

(FREDA) own means Euro(20,000), totaling Euro (390,000). It was implemented during the period between April 2017 to September 2020, for (42) months. The target groups was the rural people (4322 households) living in (36)village of Pyapone, Bogale, Mawkyun and Laputta townships of Ayeyarwady Region. The activities were, SRI (80 ha) for (100) farmers, LED, for 1200 families, Save 60 Cookstove for 1600 families, Aqua forestry 8 user groups, wood lot (36 ha), Community Forestry/ Mangrove plantation (80 ha) and 20 trainings on DRR and livelihood.

7.3.10 FREDA got the opportunity for human resource development program from RECOFTC, to attend the Participatory Monitoring Evaluation and Learning in 2022-2023. One executive committee member and CFUG member from Pyndaye reserved forest attended this PMEL training and he was assigned to do evaluation on Mangrove Ecosystems Restoration and Community Development Project phase one to phase five.

7.4 Threats:

7.4.1 Land Use Change for Rice Cultivation

The conversion of mangrove forests into paddy fields for rice cultivation in the Ayeyarwaddy Delta of Myanmar is a significant land use change driven by the need for food security in the region. While rice is a staple crop for local communities and essential for ensuring food supply, this shift from mangrove ecosystems to agricultural land has critical environmental consequences. Mangrove forests act as natural barriers against coastal erosion, storm surges, and flooding, while also providing habitats for various marine species and serving as important carbon sinks. Their destruction for paddy farming compromises these ecological services, increases the vulnerability of coastal areas to climate impacts, and disrupts local fisheries that rely on healthy mangroves. Balancing the need for food security with environmental sustainability is crucial, as unchecked conversion of mangroves could lead to long-term ecological damage, threatening the very livelihoods that depend on both rice farming and coastal resources in the Ayeyarwaddy Delta. Sustainable land-use practices and integrated coastal management are needed to preserve the benefits of both ecosystems. In the Ayeyarwaddy Delta of Myanmar, mangrove restoration efforts are gaining attention in abandoned rice fields, where declining rice productivity has made cultivation unsustainable. These areas, once converted from mangrove forests for agricultural use, often suffer from poor soil quality, salinity issues, and flooding, making rice farming less viable over time. As rice yields decrease, many of these degraded fields are left unused, creating an opportunity for mangrove reforestation. Restoring mangroves in these areas offers numerous ecological and socio-economic benefits. Mangroves help revitalize soil health, improve coastal protection against storms, and restore biodiversity by providing

habitats for fish, crabs, and other marine species. They also contribute to carbon sequestration, playing a crucial role in mitigating climate change. For local communities, mangrove restoration can provide alternative livelihoods, such as fishing, beekeeping, or eco-tourism, while enhancing the resilience of coastal ecosystems. Reclaiming abandoned rice fields for mangroves is a sustainable strategy that helps balance environmental recovery with the long-term well-being of the delta's inhabitants.

Promote Responsible Agricultural Investment-RAI to address the conversion of mangrove forests into paddy fields for rice cultivation. RAI refers to investment practices in agriculture that are designed to be sustainable, ethical, and beneficial to all stakeholders involved, including local communities, the environment, and investors. Responsible Agricultural Investment promotes agricultural projects that support food security, reduce poverty, encourage equitable land use, and protect natural resources.

The Principles for Responsible Agricultural Investment often emphasize:

1. **Respect for Land and Resource Rights:** Protecting the land rights of local communities and indigenous peoples, ensuring investments don't lead to land grabbing or displacement.
2. **Food Security and Nutrition:** Ensuring that investments contribute positively to local and global food security rather than threatening it.
3. **Transparency and Good Governance:** Promoting clear, accountable practices in decision-making, with inclusive stakeholder engagement and anti-corruption measures.
4. **Economic Viability and Shared Prosperity:** Supporting long-term financial sustainability that benefits investors as well as local economies, creating fair and decent work opportunities.
5. **Environmental Sustainability:** Adopting practices that conserve natural resources, protect biodiversity, and reduce negative environmental impacts.
6. **Social Equity and Inclusivity:** Ensuring investments are inclusive and equitable, especially considering the needs of vulnerable groups, such as smallholder farmers, women, and youth.

7.4.2 Threat to supply fuelwood and charcoal for cities

The electricity shortage in major cities such as Yangon, Patheingyi, and Pyaw Oye is putting significant pressure on nearby mangrove forests as people increasingly turn to these forests for charcoal and fuelwood. This rising demand threatens the sustainability of the mangroves, particularly as charcoal is also being exported to Thailand for use in barbecues, further depleting resources. Additionally, the local dry shrimp processing industry heavily relies on fuelwood, intensifying the pressure on the forest. Another major contributor to defor-

estation is the construction of “tiger mouth nets” (Kyarr Phong) for sea fishing, which not only requires building materials harvested from mangrove trees but also uses fuelwood to support the fishing activities. The combined impact of these industries and electricity shortages poses a severe threat to the survival of mangrove ecosystems in the region.

7.4.3 Illegal Cutting Of Mangroves Trees

Mangrove Ecosystems Restoration and Community Development Projects in Myanmar face numerous challenges, including illegal activities that threaten the sustainability of these critical ecosystems. One significant threat is the illegal cutting of mangroves for fuelwood, which is often used for local industries such as the production of dry shrimp. This process requires large amounts of firewood to dry the shrimp, leading to widespread deforestation. Additionally, fishing communities contribute to mangrove destruction by cutting down trees for fuelwood and to build ‘tiger mouth net’ (Kyarr phong) for sea fishing. These practices not only deplete mangrove forests but also undermine reforestation efforts, as newly planted areas are often targeted for illegal harvesting. The loss of mangroves reduces coastal protection, erodes biodiversity, and disrupts the livelihoods of local communities dependent on the health of these ecosystems for fishing and protection against storm surges. Addressing these threats requires stricter enforcement, alternative livelihood programs, and community involvement in protecting and restoring mangroves.

7.4.4 Land Use Change for sun-dried salt

The owner of a salt manufacturing and trading business in Pyapon Township, said that they were able to export and sell sun-dried salt from Pyapon Township in Pyapon District, Irrawaddy Region, to the Yangon market in July, 2024. Exporting and selling local sun-dried salt from Pyapon Township to the Yangon market. Mangrove forests face significant threats from sun-dried salt production, where large areas of coastal land are cleared and transformed into salt pans for the extraction of salt from seawater. This land use change involves the removal of mangroves to create flat, exposed surfaces where seawater can evaporate, leaving behind salt. The destruction of mangroves for this purpose leads to the loss of vital ecosystems that provide coastal protection, support marine biodiversity, and act as critical carbon sinks. In addition, salt production in these areas increases soil salinity, further hindering the possibility of mangrove regeneration and impacting nearby agricultural lands. As an alternative, sustainable salt production methods such as solar salt production in designated saline areas or the use of integrated mangrove-aquaculture systems can be explored. These approaches can reduce the need for mangrove clearance, allowing for salt production without compromising the environmental health of coastal zones. By adopting more eco-friendly techniques, it is possible to balance the economic benefits of salt production with the conservation of mangrove forests and their essential services.

7.4.5 Plastic Bags Used in Mangrove Reforestation

Threat to Marine Ecosystem and Environment from Plastic Bags Used in Mangrove Reforestation: Mangrove reforestation plays a vital role in protecting coastlines, supporting biodiversity, and mitigating climate change. However, the use of plastic bags for raising seedlings in such projects poses a significant threat to the marine ecosystem and environment. In a Mangrove Ecosystems Restoration and Community Development Project where 1,200 seedlings were raised using 7x3-inch plastic bags, these bags were discarded in the field after transplanting, contributing to environmental degradation. The project manager also reported that approximately 6 lbs of plastic containers and polyethylene bags are required per acre to raise the seedlings. Over the last 25 years, the project has used 47,523 lbs of plastic for mangrove plantation efforts covering 7,920.5 acres (3,199.46 hectares).

Key Threats to the Marine Ecosystem and Environment: Plastic Pollution in Coastal and Marine Habitats: The plastic bags discarded in the field contribute to the accumulation of plastic waste in coastal areas and eventually make their way into marine ecosystems. Once in the ocean, these plastics persist for hundreds of years, breaking down into microplastics that are easily ingested by marine organisms such as fish, birds, and other wildlife.

Harm to Marine Wildlife: Plastic bags and containers are often mistaken for food by marine species. Sea turtles, for instance, may ingest plastic debris, mistaking it for jellyfish, while seabirds and fish often consume microplastics. This can lead to blockages in their digestive systems, starvation, and death. Entanglement in larger pieces of plastic debris also poses a risk to animals like seals, dolphins, and sea birds.

Disruption of Marine Food Chains: Microplastics, formed as larger plastic items degrade, are consumed by small marine organisms such as plankton. This introduces plastic into the marine food chain, affecting not just smaller organisms but also the larger predators that feed on them. The contamination of the food chain can eventually affect human health as well, as microplastics make their way into seafood consumed by people.

Degradation of Mangrove Ecosystems: Mangrove ecosystems are critical nurseries for a variety of marine species and act as carbon sinks that help combat climate change. The presence of plastic waste in these habitats disrupts the natural growth of mangrove seedlings and the surrounding biodiversity. Plastics can block the root systems, impairing the natural filtering processes that mangroves provide, which protect coastal areas from erosion and storm surges.

Chemical Pollution: Many plastics contain harmful chemicals such as bisphenol A (BPA) and phthalates, which leach into the soil and water as the plastics degrade. These chemicals are toxic to both terrestrial and marine organisms, disrupting reproductive systems and leading to hormonal imbalances in wildlife.

Long-Term Accumulation of Waste: With 47,523 lbs of plastic used over 25 years, the scale of plastic pollution from the project is significant. Even though reforestation is essential for ecosystem restoration, the use of non-biodegradable plastic undermines the environmental benefits. Over time, as plastic waste continues to accumulate, the overall health of the

ecosystem deteriorates, reducing the long-term success of mangrove reforestation efforts. **Recommendations to Mitigate Threats: Switch to Biodegradable Alternatives:** Instead of polyethylene bags, the project should adopt biodegradable materials for raising seedlings, such as jute or coir pots, which can decompose naturally without harming the environment. **Recycling and Proper Disposal:** Establishing proper waste management protocols to collect, recycle, or safely dispose of plastic bags used in nurseries could reduce the environmental impact. **Public Awareness and Policy Intervention:** Greater awareness about the negative impacts of plastic waste and stronger policies governing the use of plastic in reforestation projects can help reduce marine pollution and encourage sustainable practices. By addressing the issue of plastic waste in mangrove reforestation, we can ensure that the environmental benefits of these projects are not undermined by the harmful effects of plastic pollution on the marine ecosystem.

7.4.6 The ghost crab

The ghost crab (*Ocypode* spp.), known for its opportunistic feeding behavior, often targets the fruits and the base of young seedlings of *Avicennia officinalis*, a key mangrove species. By consuming the fruits, these crabs can disrupt the natural regeneration process by preventing seeds from germinating and establishing new plants. Additionally, they can damage the base of the seedlings' stems, leading to structural weakness, wilting, and sometimes the death of young plants. This behavior poses a threat to the early stages of mangrove growth, as the crabs' feeding can significantly reduce the number of surviving seedlings. The impact is especially notable in coastal areas where ghost crabs are abundant and can slow down the regeneration of mangrove forests, which are critical for coastal protection, biodiversity, and carbon sequestration.

7.4.7 Leaf Defoliator

The **leaf defoliator insect** that feeds on the leaves and stems of *Avicennia officinalis* (a mangrove species) can cause significant damage to the tree, particularly in young seedlings. These insects consume the tender leaves and stems, reducing the plant's ability to photosynthesize and weakening its overall structure. The damage is often more severe in seedlings, where defoliation can lead to a condition known as seedling blight. This disease symptom is



characterized by the wilting, browning, and death of the young plants, often starting from the leaf tips and spreading to the entire seedling. The combination of insect damage and seedling blight can lead to poor growth and high mortality rates in affected areas, significantly impacting the regeneration of mangrove forests. Effective management of these leaf defoliators is essential to protect the health of *Avicennia officinalis* and maintain the ecological balance of mangrove ecosystems.[6]

8. Community Voice

8.1 The “River of Life” storytelling technique

The “River of Life” storytelling technique was used to raise the “Community Voice”, and promote the stakeholder engagement. They are powerful tools in community engagement, aimed at eliciting personal stories, shared experiences, and collective insights. They are used to build trust, foster dialogue, and ensure community members feel heard and empowered in decision-making processes. The “River of Life” storytelling technique is a visual and participatory method used to help individuals and communities reflect on their personal journeys or collective experiences. Evaluation team listened to the “Community Voice” to know active participation of community members in Mangrove Ecosystems Restoration and Community Development Project. It focuses on ensuring that diverse perspectives, especially from underrepresented or marginalized groups, are included and valued. Community voice can be read in the publication of FRED A, 20 years in Pyindaye. Evaluation team asked question to hear the voice from some villages of community forest. The voice of key stakeholders of community forests are collected from the following persons;

Table 8.1 Story tellers’ background

Sr	Name	Position	Community’s name	Area (Acre)	Location (Pyarpon Township, Ayeyarwaddy Region)	CF Certificate Granted Date	CFUG members
1	U Than	secretary	2 Ba Wa Thit CF	800	Pyindaye RF (Compt. 50, 53, and 55)	15.5.2017	
2	U Than Htun	chairman	3 Ba Wa Thit CF	400	Pyindaye RF (Compt. 55 and 56)	15.5.2017, 30.6.2018	58, 35
3	Mr. Saw Je Je	dedicated member	Aung Kone CF	169.6	Pyindaye RF (Compt. 52)	10.10.2017	27

Sr	Name	Position	Community's name	Area (Acre)	Location (Pyarpon Township, Ayeyarwaddy Region)	CF Certificate Granted Date	CFUG members
4	U Hlaing Min Htun	chairman	Htan Pin Kone CF	183, 200	Pyindaye RF (Compt. 60 and 61)	10.11.2017, 11.6.2020	35, 44
5	U Saw Htoo Kay Hlaing	secretary	Kan Gyi Ba Aye CF				

Success Stories and lesson learnt from Community Forests:

1. 2 Ba Wa Thit community forest's key achievements include successful mangrove plantations supported by FREDa and ACTMANG, regular forest patrols, and efficient cooking stoves in 20% of households. Despite challenges such as the need for reforestation on 80 acres, the community has initiated a mud crab breeding business for additional income.
2. 3 Ba Wa Thit Community Forests has seen forest cover increase by 50%. With 142 hectares of mangrove plantations, 70% survival, and active patrols, their sustainable practices are commendable. However, gaps in reforestation (50 acres) and the desire to start a mud crab business remain ongoing challenges.
3. Though silviculture and patrols are lacking, Aung Kone Community Forest has been successful mangrove plantations of 32 hectares thrive. The community uses minimal fuelwood, but 30 acres need reforestation. A planned mud crab business faces technical and financial hurdles, yet the community's hope and dedication remain strong.
4. Htan Pin Kone Community Forest has experienced increased forest cover, despite the absence of silviculture and insufficient patrols, no land conversion has occurred. Challenges include inefficient stove use, irregular CFUG meetings, and the need for 50 acres of reforestation. Their dream of a mud crab breeding business faces financial obstacles, but with support, the forest's future looks promising.
5. The four leaders from above CFs share a common vision of sustainable forest management. They manage mangrove plantations with support from organizations like FREDa and ACTMANG, focusing on sustainability through activities like silviculture, patrolling, and fuelwood harvesting. Despite challenges such as reforestation needs and lack of efficient cooking stoves, they strive to protect their forests from land use changes. The goal is to foster livelihood development through projects like mud crab breeding, supported by revolving funds and community enterprise. Each leader's community works together through monthly meetings and governance structures

to ensure the forest's health and future, despite facing resource gaps. These leaders demonstrate resilience and the power of collaboration with organizations like FREDa and ACTMANG. Their shared goal of sustainable forest management and community-driven enterprises showcases a commitment to long-term conservation and improved livelihoods.

6. Kan Gyi Ba Aye community forest recommended to ensure the success of their Community Forest, enhance forest management practices, including regular patrolling and monitoring to prevent encroachment; increasing community awareness and engagement; promoting efficient cooking stoves to reduce fuelwood use; focusing on reforestation efforts; ensuring financial transparency; and establishing a community forest enterprise for economic sustainability. Additionally, improving communication with the forest department and submitting regular progress reports is crucial for fostering collaboration and securing support for the forest's conservation.

8.2 Poem writers' reviews of 20 years in Pyindaye

Some poems of 20 years in Pyindaye are reflected the voice of key stakeholders of community forests.

Table 8.2 Poem Writers' background

Sr	Pen Name	Village	Name of Poem/ poetry	Experience in Mangrove forest
1	U Win Win	Kanyingone	20 Years in Pyindaye	Two decades of mangrove conservation
2	Mangrove Argyi	Oakpho	Come here, Friend	Decline of mangrove forests in Pyapon township, Myanmar, over the past four decades
3	U Saw Kyaw Shein	Lay Pin Chaung	Let us all participate	Local community
4	U Tun Tun	Kannarkwin	Let us conserve mangrove forest	Local community

1. U Win Win's poem reflects on two decades of mangrove conservation in Pyindaye, capturing both the loss and recovery of the mangrove ecosystem. He acknowledges the destructive impact of human activities while celebrating the community's shift toward sustainable forest management with FREDa's help. The poem highlights the importance of collaboration and responsibility in conservation, emphasizing hope for

the future. U Win Win suggested to “Continue promoting community-driven efforts and sustainable practices, ensuring that conservation initiatives are adaptive to the evolving challenges of environmental degradation and community needs.

2. Mangrove Argyi’s poem reflects on the decline of mangrove forests in Pyapon township, Myanmar, over the past four decades. It describes the transition from abundance to destruction, driven by deforestation, unsustainable practices, and climate disasters. Despite the loss, Argyi calls for collective action to restore the mangroves, emphasizing the need for community cooperation and conservation efforts for the benefit of future generations. Mangrove Argyi suggested that the community must unite with organizations like FREDa, adopting sustainable practices and prioritizing conservation to restore mangrove ecosystems and ensure future protection from natural disasters.
3. U Saw Kyaw Sein’s poem highlights the urgent need for collective action to conserve mangrove forests. He laments the personal struggles of his community and the overwhelming deforestation. Emphasizing the vital role of mangroves for biodiversity and climate protection, he calls for a unified effort to restore them. His plea underscores the importance of cooperation, education, and leadership in driving conservation efforts. U Saw Kyaw Sein suggested to mobilize the community for collective conservation efforts, promote education and spread awareness to inspire action, and prioritize long-term sustainability over immediate resource extraction.
4. U Tun Tun’s poem reflects a deep sense of loss over the degradation of mangrove forests, once abundant and vibrant, now reduced to fragile remnants. Despite this, he emphasizes the importance of restoration through careful planting and community involvement. The poem calls for urgent action to preserve and regenerate these vital ecosystems, urging everyone to take responsibility and contribute to long-term restoration efforts. U Tun Tun suggested to act now to restore mangrove forests through community-driven efforts, emphasizing education, dedication, and collaboration to ensure their survival for future generations.

8.3 Focused Group Discussion During the second evaluation field trip

The Evaluation Team arrived at Bahosi camp at 5:00 PM on September 19, 2024, where they met with field staff from ACP. They then proceeded to Oakpho camp. During the trip, the Evaluation Team discussed the evaluation program. It was noted that A Shae Pyar Community Forest (CF) is off-limits to ACP staff during winter. Reports indicated that CFs from A Shae Pyar, Nauk Pyan Toe, and Kyauk Taing no longer exist, having vanished from the field. Moreover, Kyauk Taing village itself disappeared. Kadatkwin has since planted a mangrove forest and applied for a Community Forest certificate, but permission

was not granted. The mangrove reforestation team needs to conduct field observations, including assessing gaps, degraded mangrove forests, and species like Dani and Thin Paung mangroves. They must develop a restoration plan to secure funding from donors. FREDa needs to use Google Earth to observe and identify areas where land use has changed. MERN is assisting with Community Forest applications. The Evaluation Team also discussed recording photographs with GPS points. The GNSS status is crucial; if it shows “No Fix,” the GPS points are incorrect. If it shows “Fix,” the GPS points are accurate. The GPS points can be viewed using the My Track software.

Table 8.3 Recorded GPS points of the observed Community Forest at 20th September, 2024

Sr	Observed area, Community Forest	Latitude, Longitude
1	Nga Dan Se Community Forest	15° 45' 39.94"N 95° 25' 20.66"E
2	Ba Ho Si Camp, Forest Nursery	15° 47' 16.76"N 95° 23' 09.23"E
3	Ka Dat Kwin Community Forest	15° 48' 16.91"N 95° 28' 23.41"E
4	Ka Nyin Kone Community Forest	15° 48' 26.88"N 95° 28' 06.76"E
5	Khar Chin Kyun Community Forest	15° 47' 45.72"N 95° 26' 49.17"E
6	Kywe Te Community Forest	15° 47' 48.77"N 95° 28' 21.38"E
7	Kywe Te Community Forest	15° 47' 45.18"N 95° 24' 13.15"E

8.4.1 Focused Group Discussion with FREDa evaluation team and CFUGs members

Evaluation team made focused group discussion on 20th, 21st, and 22nd September, 2024 with the community forest user group. Participants list and their voice were recorded.

Table 8.4 List of participants, who attended at focused group discussion on 20-9-2024, 21-9-2024 and 22-9-2024

Sr	Name of CFUG member	Name of CF	Date
1	U Thein Lwin 959 266019145	Ka Dat Kwin	20-9-2024
2	U Shine Ko Ko Lwin 959 458815358	Ka Dat Kwin	20-9-2024
3	U Htun Aung Kyaw	Ka Dat Kwin	20-9-2024
4	U Aung Thu	Kywe Te Community Forest	21.9.2024
5	Daw Hla Nwe	Kywe Te Community Forest	21.9.2024
6	U Naing Lin Htet	Kywe Te Community Forest	21.9.2024
7	U Min Min Hlaing	Kywe Te Community Forest	21.9.2024

Sr	Name of CFUG member	Name of CF	Date
8	U Khin Zaw Oo	Te Pin Seik village	21.9.2024 11 am to 12:55 pm
9	U San Oo Hlaing, 959 428254464	Oak Pho CF	22.9.2024 (morning)
10	U Khin Mg Htay	Oak Pho CF	22.9.2024 (morning)
11	U Kyaw Moe	Oak Pho CF	22.9.2024 (morning)
12	U Than	Secretary, 2 Ba Wa Thit CF	22.9.2024 Afternoon:
13	Daw Thaung Khin	Finance Manager, 2 Ba Wa Thit CF	22.9.2024 Afternoon:
14	Daw Hnin Yi	EC member, 2 Ba Wa Thit CF	22.9.2024 Afternoon:
15	Daw Than Than Win	CFUG Member, 2 Ba Wa Thit CF	22.9.2024 Afternoon:
16	U Maung Maung	CFUG Member, 2 Ba Wa Thit CF	22.9.2024 Afternoon:
17	Daw Than Myint	CFUG Member, 2 Ba Wa Thit CF	22.9.2024 Afternoon:
18	Daw Nge Hla Chay	CFUG Member, 2 Ba Wa Thit CF	22.9.2024 Afternoon:
19	U Aung Than	Responsible Person	22.9.2024 Afternoon:
20	Daw Khin Cho Win	Responsible Person	22.9.2024 Afternoon:
21	U Tint Lwin	Observer	22.9.2024 Afternoon:
Participants of Evaluation team			
22	U Mya Win	Executive Committee member, FREDA	22.9.2024 Afternoon:
23	U Soun Htwe	Secretary, FREDA	22.9.2024 Afternoon:
24	U Kyaw Soe Htun	Project Manager, FREDA	22.9.2024 Afternoon:

Sr	Name of CFUG member	Name of CF	Date
25	U Soe Min	FREDA	22.9.2024 Afternoon:
26	U Pai Zin Oo	Range Officer, Forest Department, Pyarpon township	22.9.2024 Afternoon:
27	U Htet Wai Yan Aung	FREDA/ACP	22.9.2024 Afternoon:
28	U Aung Ko Ko	FREDA/ACP	22.9.2024 Afternoon:

The Evaluation Team, including U Mya Win, U Soun Htwe, U Soe Min, U Kyaw Soe Htun, and U Pai Zin Oo (Range Officer 959 74911838), met with U Thein Lwin (959 266019148) at his community forest. U Thein Lwin shared that in 2023 he planted 3 acres of *Avicennia officinalis* L. and *Byu*. However, ghost crabs have been girdling the base of *Avicennia officinalis* L., leading to their death. The seeds of *Avicennia officinalis* L. can be dispersed by tidal water and grow up to two feet within a year, but ghost crabs consume the fruits. After direct seed sowing, all *Avicennia officinalis* L. fruits were eaten by ghost crabs. Leaf defoliators were also found on *Avicennia officinalis* L. at the mangrove nursery. He explained several methods to prevent ghost crab damage:

1. Spread 5 pyi of crushed rice per acre. Ghost crabs consume the rice and, within 5 days, their shells soften, making them easy prey for mud crabs.
2. Ghost crabs prefer *Avicennia officinalis* L. when weeds are cleared. Therefore, clear weeding is unsuitable where ghost crabs are abundant.
3. Wrapping the tree base with plastic can protect *Avicennia officinalis* L. from ghost crabs.
4. Breeding mud crabs can naturally control the ghost crab population, as mud crabs prey on ghost crabs. Mud crabs can reach merchantable size within a month in the mangrove forest.

The Evaluation Team had a focused group discussion with U Shine Ko Ko Lwin (ph 09 498815358), Secretary U Htun Aung Kyaw, and U Thein Lwin. U Shine Ko Ko Lwin mentioned that in 2023, the chairman and 27 CFUG members applied for a community forest certificate for Ka Dat Kwin and 3 Ba Wa Thit CFUGs group, but their application was postponed due to an order from the Director General Office. Range Officer U Pai Zin Oo (ph 09 974911838) explained that the area overlapped with Khar Chin Kyun CF, which received CF permission in 2001 for U Khin Kyine and U Khaing Win. Hence, permission for the overlapped area is not allowed.

The Evaluation Team listened to a “River of Life” storytelling from U Khin Zaw Oo of Te Pin Seik village at 12:55 on September 21, 2024. U Khin Zaw Oo, who earns his living from his mini store and light truck transportation between Pyarpon and Bogalay township, attended a 2017 meeting where he heard an environmental conservation talk by U Ohn, Chairman of FREDa. Inspired by U Ohn’s speech, he planted various mangrove tree species and developed a love for them. His hobby is tree planting, and he has never engaged in tree cutting. He planted mangrove trees at West Ma Yan community forest, located between Te Pin Seik bridge and 3 Ba Wa Thit village. Covering an area of 24 acres, he planted *Avicennia officinalis* L., *Lumnitzera racemosa*, *Bruguiera gymnorhiza*, *Bruguiera sexangula*, and *Bruguiera cylindrica*. A 17-acre CF plantation is situated between the left side of Pyarpon-Amar Road and Te Pin Seik. Pruning is carried out at this plantation using daily wages (12,000 to 15,000 kyats), costing 500,000 kyats. Pruned twigs and branches can be used for two years for cooking food. This CF does not receive silt from tidal water due to the presence of freshwater, causing organic matter to accumulate in the water, which turns reddish-brown like peat water. Consequently, the trees do not grow quickly. *Lumnitzera racemosa* were planted with 3’ x 3’ spacing. U Khin Zaw Oo (ph 959 679749430) stated that the plantation is seven years old. FREDa planted it in 2017, and weeding was done in the second year, costing 60,000 kyats per acre. Once the tree canopy covers the ground, the weeds are suppressed, and further weeding is not required. MERN planted a mangrove plantation in front of his plantation, to the right side of Pyarpon-Amar Road to Te Pin Seik.

In 2013, the cancellation of reserved forest status was done for rice fields in Pyindaye Reserved Forest. However, farmers expanded their rice fields due to high rice prices and income. The Evaluation Team observed land-use changes from mangrove CF to rice fields in Taw Tuk. A small number of *Avicennia* were found at the boundary of rice fields in the 2018 CF plantation. A person from Yangon bought a rice field in the reserved forest and applied to establish a community forest. CFUG members planted mangrove trees in the rice field. The Evaluation Team found further land-use changes from mangrove to rice fields. They proceeded to discuss land-use changes, noting that rice fields can be created by constructing earth banks around the mangrove forest, preventing tidal water from entering the land and causing existing mangrove trees to die. Farmers can earn 1,500,000 kyats per acre, as rice productivity is 35 baskets per acre, with a market price of 30,000 kyats per basket.

CFUG members shared their responsibility in protecting their community forest from illegal logging. However, they face significant challenges, particularly with non-CFUG members engaging in illegal cutting for firewood and construction materials. They cut mangrove trees and sell them to tiger mouth fishing net and dry shrimp processing enterprises of various scales. The primary issues identified were non-CFUG members harvesting firewood, poles,

and posts, especially mangrove wood, due to its durability in seawater and resistance to strong winds. The demand for mangrove wood stems from its use in constructing tiger mouth fishing nets, which consume large amounts of firewood and wooden materials. Transportation of these materials is convenient, as the tiger mouth fishing nets can be reached within a few hours from the community forest.

The evaluation team recorded the community's voice through a focused group discussion. The CFUG members planted mangrove trees annually and rarely cut them. When illegal logging was found, they reported it to the Forest Department, but it was challenging to invite Forest Department staff to take action. CFUG members expressed concerns about their ability to manage these challenges without additional support from the Forest Department. They questioned whether the Forest Department actively assists in protecting the forest from illegal logging activities and whether the community forest permit would be canceled if illegal logging by non-CFUG members or others continues and impacts the forest's condition.

The Forest Department clarified that it will investigate reported cases of illegal logging by CFUG members, and the decision to extend or cancel the community forest permit will depend on the CFUG's efforts to protect the forest and the persistence of illegal logging.

Evaluation team recorded the following proposed actions from the focused group discussion;

- Establish a clear and efficient reporting system for CFUGs to report illegal logging incidents to the Forest Department.
- Conduct regular joint patrols involving CFUG members and Forest Department staff to deter illegal activities.
- Conduct awareness campaigns for non-CFUG members to promote the importance of sustainable forest management and the consequences of illegal logging.
- Encourage the participation of non-CFUG members in community forest management initiatives, potentially as new CFUG members.
- Develop stricter rules for monitoring and protecting community forests, with active involvement from CFUGs.
- Train CFUG members in conflict resolution to address disputes with non-CFUG members.
- Provide alternative construction materials and energy sources to reduce reliance on mangrove wood.

- Support livelihoods through initiatives like sustainable aquaculture, eco-tourism, or mangrove-based value-added products.
- Advocate for stricter enforcement of forest protection laws to prevent illegal logging and promote mangrove reforestation by involving stakeholders from the tiger mouth fishing net and dry shrimp processing industries, as well as abandoned rice field areas, to inform decision makers, policy makers, and regional government.
- Review and update community forest policies to reflect shared responsibilities and ensure fairness in addressing unauthorized activities.

The discussion highlights the critical challenges faced by CFUG members in safeguarding their community forest from illegal logging. While CFUGs are dedicated to fulfilling their responsibilities, collaboration with the Forest Department and broader community engagement are essential to ensure the sustainability of community forests. The proposed recommendations aim to address these challenges and strengthen the capacity of CFUGs to manage their forests effectively.



9. Unexpected Results

Mangrove forest cover is being significantly impacted by land use changes, particularly for salt production, rice cultivation, and fish and shrimp breeding, all driven by food security concerns. Salt production requires large areas of cleared land, and mangroves are often the first to be cleared, causing substantial habitat loss. Similarly, rice cultivation has expanded into former mangrove areas due to the need to ensure food security, with mangroves being converted into rice paddies. Fish and shrimp farming, which also supports food security, has seen rapid and unplanned growth, further accelerating the destruction of mangrove ecosystems. In addition to land use changes, over-exploitation of forest products is a serious threat. Local communities rely heavily on mangroves for fuelwood, particularly for dry prawn processing and charcoal production, as well as for domestic consumption. Mangroves are also cut for construction materials and to supply the fishing industry, particularly for the building of “tiger mouth nets” (Kyarr Phong). This relentless demand for resources far outpaces replanting efforts, leading to a net loss in mangrove forest cover. The cumulative impact of these activities—unregulated agricultural expansion, aquaculture, and unsustainable harvesting—has resulted in environmental degradation, resource conflicts, and widening socio-economic disparities. Reforestation of abandoned farms and shrimp ponds offers a potential solution for restoring the ecosystem, but it needs to be done swiftly to improve sustainability before further land-use decisions are made. In the Ayeyarwady Delta, deforestation is largely driven by poverty and lack of awareness about sustainable practices, emphasizing the importance of community education and proper forest management to protect these vital coastal ecosystems, which serve as natural shields against environmental calamities.[7]



Oak-Pho, Gawdu 2017 Plantation N 15°, 50 ‘, 18.16”= 15.83838, E 95°, 24’, 31.56”= 95.40877
15.83838N 95.40877E

10. Lessons Learnt and Recommendations for the Phase VI

10.1 Difficulties & lesson learnt by the project staffs

The project staff faced a range of challenges while working in the field, particularly due to the severe weather conditions in the coastal areas. Storms, heavy rainfall, and strong winds were common, making work difficult and often dangerous. These weather conditions delayed critical tasks, as staff had to wait for favorable weather conditions to safely navigate boats during high and low tide periods, significantly extending project timelines. Another major challenge was the lack of clean and portable water at the project site. The availability of purified water was limited, and water pollution was a persistent issue due to open toilets and the improper disposal of waste into nearby streams and rivers, contaminating water sources for the staff and local communities. Social challenges also emerged. The lack of educational opportunities for the children of project staff was a significant issue, as the remote project locations had limited access to schools, especially those providing higher education. Additionally, the wives and family members of project staff faced difficulties finding employment, as job opportunities were scarce in these isolated areas, adding financial strain to their households. Accessibility to the project sites from larger towns such as Yangon and Pyapon was particularly problematic, especially during the rainy season when bad road conditions made travel slow and difficult. The lack of healthcare facilities at the project site further compounded the difficulties, as staff and their families had no immediate access to medical care in case of illness or injury. These challenges taught project staff important lessons, such as the need for better infrastructure, including water and sanitation systems, improved transportation networks, and community support services like schools and healthcare. Addressing these issues would not only improve the working and living conditions of staff but also enhance the overall effectiveness and sustainability of the project.

10.2 Difficulties & Lessons Learned by Beneficiaries

Beneficiaries of the community forest program faced numerous challenges, primarily due to a lack of regular income to support the management and protection of their forests. Without adequate funding, they struggled to acquire essential resources such as patrolling boats and equipment to safeguard their community forests. Additionally, there was a lack of participation from non-CFUG (Community Forest User Group) members, making it harder to effectively protect these vital resources. Food security concerns, coupled with the high price of rice, have driven land-use changes, as many residents convert forest land into agricultural fields to meet their basic needs.

The severe weather conditions of the delta, including storms, heavy rainfall, and strong winds, posed additional difficulties, particularly when navigating by boat, as residents had to wait for favorable tides to travel. Access to portable and purified water was limited, and water pollution caused by open toilets and improper waste disposal further deteriorated living conditions. Villagers lacked proper sanitation facilities, compounding health risks.

Social issues also emerged, including the lack of higher education opportunities for children, leaving them with few prospects for future development. Job opportunities for the wives and family members of villagers were scarce, which added to the financial pressures faced by households. Poor accessibility from Yangon and Pyapon, especially during the rainy season when roads became impassable, isolated communities further. The lack of healthcare facilities in the area made it difficult for beneficiaries to access medical care when needed. These challenges have highlighted the importance of addressing basic needs, such as income generation, education, healthcare, and infrastructure, to ensure the long-term success of community forest management.

10.3 Recommendations for the Mangrove Ecosystems Restoration and Community Development Project Implementation Team and FRED A

1. Conduct FPIC (Free, Prior, and Informed Consent) before mangrove reforestation begin. FPIC build community agreement on land use, ensuring local investment in protecting reforested areas from illegal activities, and preventing land-use changes for shrimp or fish farming or expansion of rice field. This approach fosters sustainable, community-driven conservation efforts.
2. Make record of the handover of mangrove plantations, established at community forest for accountability and continuity in managing and maintaining the plantation. It formalizes the transfer of responsibility, ensuring that the community forest user groups and management committee of community forest are aware

of their duties, the plantation's status, and any specific management practices. This documentation also serves as a reference for tracking growth, health, and challenges, and it can be used to resolve disputes, plan for resources, and secure ongoing support and cooperation from stakeholders.

3. **Site Selection and Species Choice:** The success of the Mangrove Ecosystems Restoration and Community Development Project depends on choosing the right site and planting species that are well-suited to the local environment and ecosystem needs. Careful evaluation of soil conditions, tidal patterns, and climate will improve the survival rate of the plantations.
4. **Sustainable Planting Techniques:** The team should adopt planting techniques that address both ecological and community concerns, ensuring that reforestation aligns with environmental, social, and economic needs.
5. **Monitoring and Adaptive Management:** Continuous monitoring of key indicators such as mangrove growth, biodiversity recovery, and community participation is essential. Adaptive management strategies should be applied to respond to emerging challenges and opportunities as the project evolves.
6. **Suitable silvicultural operation** should be done at required area to reduce dense canopy shade, to provide sunlight and space essential for the growth of young mangrove seedlings and saplings.
7. **Regular Evaluation:** FREDa, ACTMANG, and the project team should regularly evaluate the project's progress in relation to its objectives, donor expectations, and stakeholder needs. This includes assessing environmental impacts such as habitat restoration, biodiversity conservation, and protection from natural disasters like storm surges and erosion.
8. **Community Engagement and Support:** The project's success relies heavily on community involvement. It is important to foster local ownership by aligning the project with community needs and traditional knowledge. Workshops and awareness campaigns can increase community support and participation.
9. **Socio-Economic Benefits:** The team should assess the socio-economic benefits of the project, including opportunities for ecotourism, sustainable harvesting of mangrove resources, and improved coastal resilience for local communities.
10. **Collaboration with Government:** Strong cooperation with government agencies ensures that the project aligns with national and international policies related to biodiversity, climate change mitigation, and sustainable development. Ground truth observations should be shared with the forest department to promote sustainable mangrove management.

11. Advocate for stricter enforcement of forest law to prevent illegal logging and promote mangrove reforestation by involving stakeholders from the tiger mouth fishing net and dry shrimp processing industries, as well as abandoned rice field areas, to inform decision makers, policy makers, and regional government.
12. Sustainability and Capacity Building: The project should establish mechanisms to ensure its long-term sustainability, such as securing funding, building institutional support, and enhancing the capacity of local stakeholders, including community forest user groups.
13. Enhanced Monitoring and Enforcement: To protect the community forest areas, stronger enforcement of regulations against illegal logging is needed. Regular monitoring, patrolling should be implemented to prevent unsustainable practices.
14. Energy Substitution: To reduce the pressure on mangrove forests, the use of alternative energy sources such as natural gas and rice husk pellets should be encouraged in local communities, decreasing their reliance on fuelwood harvested from mangrove forest.
15. Environmental Impact Assessments (EIAs): Any proposed land use changes or developments within or near the mangrove forests should undergo rigorous environmental impact assessments to mitigate potential negative effects.
16. Reforestation and Restoration: Focus on reforestation of degraded areas with a diversity of mangrove species to improve ecosystem resilience and overall environmental health.
17. Plastic waste crisis: After transplanting mangrove seedlings, it's crucial to collect all plastic containers and polyethylene bags to prevent pollution. Reuse or repurpose them to reduce waste, and consider switching to biodegradable or eco-friendly materials like jute or natural fiber containers. Establish a recycling program to properly handle plastic waste, and dispose of non-recyclable plastics responsibly to avoid air and water pollution. Raise awareness among volunteers and the local community about the environmental impact of plastic pollution, and organize regular clean-up drives to monitor and remove any leftover plastic.
18. Strengthen credibility for carbon markets and investors, and validate carbon sequestration and ecosystem benefits.
19. Conserve mangrove ecosystems, which are important biodiversity hotspots that provide habitat for a variety of species, including rare and endangered wildlife like the fishing cat (*Prionailurus viverrinus*), migratory birds, sea turtles, and saltwater crocodiles.

20. Avoid monoculture in mangrove reforestation programs, as mangrove ecosystems are essential breeding grounds for fish, shrimp, and various other marine species.

By following these recommendations, the project team and FRED A can ensure the long-term success of the mangrove reforestation efforts while benefiting both the environment and local communities.

10.4 Recommendations for Community Forest User Groups

1. Strengthen the capacity of community forest user group (CFUG) members.
2. Promote stakeholder engagement, including non-CFUG members residing in the same village.
3. Encourage participation from local communities, villagers, and non-CFUG members living in the Pyindaye Reserved Forest who use charcoal and firewood from mangroves in the restoration and protection of mangrove forests.
4. Hold regular meetings between the management committee and CFUG members.
5. Hold elections to fill vacant positions such as chairman, secretary, and management committee members in community forests like Tebinseik, which currently appear to be unmanaged, and ownerless forest.
6. Conduct regular patrolling at the community forest area.
7. Implement boundary demarcation for the community forest.
8. Regularly report the progress of the community forest to the forest department.
9. Protect the community forest from conversion into rice fields, fish and shrimp farms, or sun-dry salt production areas.
10. Prevent illegal harvesting of fuelwood, poles, and posts for trade from the community forest.
11. Record the annual harvest of pole, post, firewood from the community forest
12. Engage with rice cultivators who may expand their agricultural land into mangrove forests and hinder reforestation efforts. Promote responsible agricultural investment in the reserved forest in delta.
13. Foster stakeholder engagement with shrimp and fish farming enterprises to prevent land-use change from mangrove forests to aquaculture ponds, which could obstruct mangrove restoration.
14. Encourage participation in mangrove conservation from dry shrimp processing enterprises that use mangrove firewood.

15. Promote conservation efforts among small and medium-scale charcoal and firewood enterprises that harvest fuelwood from the Mangrove Ecosystems Restoration and Community Development Project area.
16. Raise awareness among 'Tiger Mouth Net' (Kyarr Phong) fishing workers and owners, who use fuelwood, poles, and posts sourced from mangrove forests.
17. Promote stakeholder engagement of 'Tiger Mouth Net' (Kyarr Phong) fishing workers and owners in tree planting and protection of community forest.
18. Report incidents of illegal harvesting and land encroachment for rice cultivation to the forest department to prevent the decertification of community forests.
19. Implement participatory monitoring, evaluation, and learning approaches among community forests in the Pyindaye Reserved Forest.
20. Other community forest user groups should follow the example of the Warkone, Kywete, Pa Dauk Pin Seik, and 3 Ba Wa Thit Community Forest user groups, who practice systematic forest extraction and replanting.
21. Conserve the seed tree, mother tree and seed production area.
22. Community forest user groups should carry out silvicultural operations, such as regeneration improvement felling, climber cutting, replacement planting, gap planting, pruning, and thinning, after harvesting forest products from their community forest to ensure sustained yields.
23. Community forest user group should do suitable silvicultural operation at required area to reduce dense canopy shade, to provide sunlight and space essential for the growth of young mangrove seedlings and saplings.
24. Ka Dat Kwin, Kyauk Taing, Nauk Pyan Toe village should apply for the establishment of community forest, as they had planted mangrove trees.
25. Distribute and use efficient cook stoves stored at Tebinseik village to reduce fuelwood consumption.
26. Raise fund, revolving fund to do regular meeting, patrolling, maintenance and protection of mangrove plantation in community forest.
27. "Tidal dams constructed for land use change that block water flow should be banned immediately, as mangroves rely on tidal water and may die without it.
28. Ban the cutting of mangrove trees along riverbanks, streambanks, coastlines, and watercourse buffers to prevent bank erosion.
29. Ban tree cutting in areas where seedlings, saplings, and advanced growth are absent to ensure sustainable regeneration, or ongoing natural regeneration or long-term regrowth.

30. Take responsibility to restore and recover land with mangrove forests that was used for rice cultivation or shrimp and fish farming after those fields or ponds are abandoned.
31. Adopt felling cum regeneration plan, replacement planting, after a mangrove tree has been cut down.
32. Adopt a felling and regeneration plan, including replacement planting, gap planting, after a mangrove tree is cut down.
33. Ensure regeneration by using methods such as Strip Clear-Felling with Natural Regeneration, the Selection System, Coppice System, Shelterwood System, Enrichment Planting, and Agroforestry Systems like Mangrove-Aquaculture Integration and the integration of agricultural crops with young mangrove tree.
34. Reduce plastic pollution and fishing net pollution, particularly from ghost nets (abandoned, lost, or discarded fishing gear), is a significant environmental threat to marine and coastal ecosystems, including mangroves, coral reefs, and estuaries.

10.5 Recommendation for Policy advocacy

Evaluation team would like to recommend for policy advocacy to address deforestation, degradation of mangrove forests, over exploitations of fuelwood, pole and post for domestic use, dry shrimp processing, construction of ‘Tiger mouth net’(Kyarr phong), fuelwood demand of ‘Tiger mouth net’(Kyarr phong) for sea fishing, and expansions of rice field, and fuelwood and charcoal demand due to electricity shortage in major cities, and lack of natural gas for cooking at villages. Policy advocacy is the process of influencing decision-makers, such as governments, legislators, and institutions, to adopt policies that support a specific cause or goal. It involves research, public engagement, lobbying, and collaboration with stakeholders to create systemic change. In the context of mangrove reforestation, policy advocacy includes: Promoting legal protections for mangrove ecosystems through forest law, environmental laws and regulations. Integrating mangrove conservation into national climate policies, land-use planning, and disaster risk reduction strategies. Engaging with government agencies to secure long-term support and funding for restoration projects. Raising public awareness to build pressure for stronger environmental governance. Developing sustainable management guidelines for local communities, ensuring long-term ecological and economic benefits. Policy advocacy ensures that mangrove restoration efforts are not just short-term projects but are embedded in Myanmar’s environmental and climate resilience strategies.

1. Strengthening Community-Based Management (CBM) and Co-Management Approaches

- Empower Community Forestry User Groups (CFUGs): Strengthen the role of CFUGs in the sustainable management of mangroves. This could include providing them with training on sustainable harvesting, alternative livelihoods, and forest monitoring.
- Promote Co-management Systems: Involving local communities, government authorities, and NGOs in a shared management framework to promote sustainable practices and accountability.

2. Policy Advocacy for Resource Extraction and Fisheries

- Regulate Harvesting of Fuelwood and Poles: Introduce stricter regulations and sustainable harvesting quotas for fuelwood and poles, combined with enforcement measures.
- Promote Fuel-Efficient Technologies: Implement programs to distribute and promote fuel-efficient stoves, energy alternatives (e.g., solar or biomass) to reduce dependency on fuelwood for cooking and dry shrimp processing.
- Control Overfishing Practices: Strictly regulate harmful fishing practices, which consume large amount of fuelwood from mangrove forest, such as the use of ‘Tiger mouth nets’ (Kyarr phong), through licensing, patrolling, and penalties for illegal practices.

3. Alternative Livelihoods for Local Communities

- Support Alternative Income Sources: Promote livelihoods such as *Nypa fruticans* (Thumb.) Wurmb, the thatch that grows in the mangrove forest, dry straw of *Nypa fruticans* (Thumb.) dry straw of *Nypa fruticans* (commonly known as nipa palm) has been shown to contain antioxidants. Various parts of the *Nypa fruticans*, including its leaves, fruits, and other components, have been studied for their bioactive compounds, including polyphenols and flavonoids, which are known for their antioxidant properties. While studies specifically on the dry straw of *Nypa fruticans* are limited, there is evidence that parts of the nipa palm contain a range of antioxidants. For instance: *Nypa fruticans* leaves have been reported to contain high levels of polyphenolic compounds, which contribute to their antioxidant activity. The sap and fruits are rich in phenolics and flavonoids, which act as antioxidants, scavenging free radicals and reducing oxidative stress. It’s reasonable to hypothesize that the dry straw may also contain antioxidant compounds, especially if phenolic compounds are present in the leaves. Further research focused specifically on the

chemical composition of the dry straw would provide a more definitive answer. However, based on what is known about other parts of the plant, it likely does contain antioxidants to some degree.

- Support Alternative Income Sources from eco-tourism, aquaculture, mud crab breeding, and handicrafts, as alternatives to fuelwood collection and unsustainable fishing practices.
- Vocational Training for Fishermen: Provide training programs to transition fishermen engaged in unsustainable fishing methods to more sustainable forms of fisheries or other income-generating activities like aquaculture.

4. Incentives for Sustainable Agriculture, Responsible Agricultural Investment.

- Introduce Agroforestry Systems: Promote mangrove-friendly agroforestry systems that integrate rice fields with mangrove conservation, thereby reducing the pressure for mangrove land conversion.
- Develop Policies for Sustainable Expansion: Introduce land-use planning policies that ensure the expansion of rice fields and other agricultural activities do not encroach on critical mangrove habitats.

5. Addressing Energy Needs and Charcoal Demand

- Promote Alternative Energy Sources: Invest in infrastructure to provide clean energy alternatives (such as solar, biogas, or LPG) to reduce the reliance on charcoal and fuelwood. This is particularly important for rural areas where electricity shortages are common.
- Subsidize Clean Cooking Fuels: Create programs to make natural gas or clean cooking fuel more affordable and accessible, especially in rural areas and for industries like shrimp processing.

6. Policy Advocacy for Governance and Law Enforcement

- Strengthen Law Enforcement: Enforce existing laws that protect mangrove ecosystems from deforestation and degradation by increasing surveillance, penalties, and enforcement capacity.
- Improve Land Tenure Security: Clarify and secure land and resource rights for communities engaged in sustainable management practices, which would encourage long-term conservation of mangroves.

7. Climate Change and Resilience Planning

- **Incorporate Mangroves in National Climate Policies:** Recognize the role of mangroves in carbon sequestration and climate adaptation, and include their protection in national climate action plans (e.g., Nationally Determined Contributions (NDCs) to the Paris Agreement).
- **Promote Mangrove Restoration:** Create incentives for mangrove restoration projects that also provide job opportunities for local communities, linking mangrove conservation with climate resilience strategies.

8. Capacity Building and Awareness Raising

- **Educational Campaigns:** Conduct campaigns to raise awareness of the environmental and economic importance of mangroves, and the long-term impact of unsustainable practices.
- **Capacity Building for Local Authorities:** Enhance the capacity of local and regional authorities to manage mangrove forests, ensure compliance with regulations, and support sustainable development initiatives.

9. Research and Data Collection

- **Promote Mangrove Research:** Encourage research on the ecological, economic, and social impacts of mangrove degradation and deforestation, and promote evidence-based decision-making.
- **Establish Monitoring Systems:** Implement systems for regular monitoring and evaluation of mangrove forest health, resource use patterns, and socio-economic conditions of dependent communities.

By addressing these issues in an integrated manner, policies can help to balance the socio-economic needs of local communities while ensuring the long-term sustainability of mangrove forests.

11. Proposed Activities

The following activities are proposed to be done if doner funded to implement these activities;

1. Conduct land use change assessment, develop land use data and land use map for each community forest.
2. Develop mangrove plantation map in each community forest, where FREDa had done reforestation project.
3. Demarcate boundary of community forest, mangrove plantation boundary, natural forest boundary.
4. Measure growth rates of planted mangrove saplings and survival percentage at the time of handover to community forest user groups
5. Assess survival rates over time up to three years, by using on-site inspections and data collection
6. Collect field data in the FREDa, ACTMANG implemented reforestation project site in (28) community forests in Pyapon Township in Ayeyarwady Delta to conduct carbon accounting and estimation of carbon sequestration.
7. Conduct soil carbon assessment under the mangrove plantation established by FREDa and ACTMANG.
8. Collect regeneration, seedling, under the mangrove plantation established by FREDa and ACTMANG.
9. Evaluate changes in biodiversity within the restored community forest area.
10. Conduct ecological surveys such as change in mangrove forest coverage, mangrove species diversity, mangrove ecosystem health over time by using field survey, remote sensing techniques, aerial or satellite imagery analysis.
11. Assess changes in water quality parameters such as salinity, pH, dissolved oxygen, and nutrient levels within the restored mangrove habitats.

12. Control the disposal of plastic waste after transplanting seedling at community forest.
13. Conduct community engagement survey in mangrove reforestation and management of restored area in community forest, especially to those who use fuelwood pole and post for dry shrimp processing, construction of 'tiger mouth net' (Kyarr phong) for sea fishing, etc.
14. Consider to hire third-party verifier, which would help ensure the project's scientific accuracy, financial integrity, and long-term success, particularly if it aims to generate carbon credits or seek funding from international conservation programs.
15. Strengthen credibility for carbon markets and investors, and validate carbon sequestration and ecosystem benefits.
16. Promote awareness of the following subject for managing mangrove forests, with an emphasis on sustainable harvesting, regeneration, and ecological health:
 - Strip Clear-Felling with Natural Regeneration
 - Selection System
 - Coppice System
 - Shelterwood System
 - Enrichment Planting
 - Agroforestry System (Mangrove-Aquaculture Integration)
 - Agroforestry System (Integration of Agricultural Crops and Young Mangrove Tree Species)
 - Best Practices for Sustainable Silviculture
 - Regeneration Improvement Felling, Young improvement Felling to enhance the growth of young seedling under the shade of tree.
 - Assisted Natural Regeneration
 - Establishment of seed production area in mangrove forest.
 - Ecovillage principle.

By applying the knowledge gained from training, mangrove forests can be sustainably managed to balance the needs of harvesting and natural regeneration, ensuring long-term ecological and economic viability.



Avicennia marina Old Plantation ,FRED/ACTMANG Mangrove Project

12. Proposed strategy for start-up of next Phase VI

Evaluation team would like to propose the following strategy for the kind consideration and successful mangrove reforestation at community-owned land,

12.1. Community Involvement and Ownership

Participatory Planning: Involve the community from the outset in decision-making, site selection, species choice, and maintenance plans. Empower them with a sense of ownership over the project.

Awareness and Education: Conduct workshops on the ecological and economic benefits of mangroves, such as coastal protection, carbon sequestration, and support for fisheries.

Local Leadership: Identify and support local leaders who can champion the project and engage their peers.

12.2. Ecological Assessment and Site Selection

Site Suitability: Conduct assessments of tidal patterns, soil salinity, and existing vegetation to choose areas suitable for mangroves.

Species Selection: Choose native mangrove species that are best adapted to local conditions. Consider a mix of species for resilience and biodiversity.

Restoration Design: Avoid monoculture planting and instead recreate natural zonation, which provides better ecological function and resilience.

12.3. Capacity Building and Training

Skills Training: Provide training to community members on planting techniques, nursery management, and monitoring.

Job Creation: Link reforestation efforts to local livelihoods by creating jobs related to seed collection, nursery management, and mangrove care.

12.4. Sustainable Livelihood Integration

Sustainable Harvesting: Promote sustainable uses of mangrove resources, such as honey production, fisheries, or eco-tourism, which can generate income without damaging the ecosystem.

Alternative Livelihoods: Support alternative livelihoods like aquaculture or agroforestry to reduce pressures on mangroves and avoid land-use conflicts.

12.5. Monitoring and Adaptive Management

Regular Monitoring: Establish community-led monitoring teams to track growth, survival rates, and ecological benefits of the reforestation efforts.

Adaptive Management: Use monitoring data to adjust strategies as necessary, including modifying planting techniques or addressing any emerging challenges such as pests or disease.

12.6. Legal and Policy Support

Land Tenure Clarity: Ensure that land ownership or usage rights are clear and recognized to avoid conflicts.

Legal Frameworks: Work with local authorities to support policies that encourage mangrove conservation, such as protecting the reforested areas from future development.

12.7. Long-term Sustainability

Financial Sustainability: Explore funding mechanisms like Payment for Ecosystem Services (PES) programs, carbon credits, or partnerships with NGOs to ensure long-term financial support for the project.

Community Benefits: Ensure that the community sees tangible benefits, such as improved fish stocks, enhanced protection from coastal erosion, and potential economic gains, to foster long-term commitment.

After transplanting the seedlings, collect all plastic containers and polyethylene bags from the site. Leaving them behind can lead to pollution as they may break down into microplastics or be washed into nearby waterways.

By aligning ecological restoration with community interests and providing economic incentives, this strategy can ensure that the Mangrove Ecosystems Restoration and Community Development Project on community-owned land is sustainable and beneficial to both people and the environment.

13. Conclusion

In conclusion, the evaluation team would like to recommend “prioritizing the protection of existing mangrove forests and the restoration of degraded mangrove ecosystems through collaborative efforts involving international and national organizations.” As the mangrove conservation is essential due to their unique ecological, economic, and climate-related benefits. The evaluation team recommends to stop land use change because, mangrove forests are among the most carbon-dense ecosystems on Earth, capable of sequestering and storing significant amounts of carbon in both their biomass (above and below ground) and their deep, waterlogged soils, where organic matter decomposes very slowly. Mangrove forests can sequester an estimated 6 to 8 metric tons of CO₂ per hectare annually. Over time, they can store up to 1,000 metric tons of CO₂ per hectare, with soil carbon contributing up to 80% of this storage. This makes mangroves far more effective at carbon storage than terrestrial forests. Carbon stored in mangrove soils can remain sequestered for millennia, provided the ecosystem remains intact. This long-term carbon storage is critical for achieving global climate goals. Mangrove ecosystems hold significant economic value in global carbon markets due to their exceptional carbon sequestration capacity. Projects that protect, restore, or sustainably manage mangroves can generate carbon credits under mechanisms such as REDD+ (Reducing Emissions from Deforestation and Forest Degradation) or the Verified Carbon Standard (VCS). With mangroves sequestering 6 to 8 metric tons of CO₂ per hectare annually, the carbon credits generated could be worth \$30 to \$320 per hectare per year, depending on carbon prices. Over a 20-year period, one hectare of mangroves could generate between \$600 and \$6,400 or more in carbon revenue. Mangroves are part of blue carbon ecosystems, which are increasingly valued for their high sequestration potential in addressing climate change under agreements such as the Paris Accord.

Beyond carbon storage, mangrove forests provide vital ecosystem services that contribute to environmental health and local livelihoods. Mangroves act as natural buffers against storm surges, flooding, and coastal erosion, protecting infrastructure, agricultural lands, and communities. Their economic value in reducing potential damage is significant, saving billions of dollars annually. Mangroves are rich ecosystems that provide habitat for diverse

species, including fish, birds, and invertebrates, supporting coastal fisheries and ensuring food security for millions of people. Mangroves offer essential resources like wood, fuel, food (e.g., crabs, fish), and medicines, supporting local communities' economies and livelihoods. Mangroves have cultural significance for many coastal communities and offer eco-tourism opportunities that generate sustainable income while promoting conservation awareness.

Immediate action is required to address the ongoing threats to mangrove ecosystems. Mangroves are being lost at alarming rates due to coastal development, aquaculture (e.g., shrimp farming), and pollution. This deforestation not only releases stored carbon back into the atmosphere but also destroys biodiversity and critical ecosystem services. Mangroves are recognized as effective nature-based solutions for mitigating climate change through carbon sequestration and helping communities adapt to its impacts, such as rising sea levels and extreme weather events. Conserving and restoring mangrove forests is critical for their role as powerful carbon sinks, which makes them valuable in mitigating climate change. Each hectare of mangroves has the potential to sequester several tons of CO₂ annually, creating opportunities in the carbon market. Beyond carbon storage, mangroves provide essential ecosystem services, such as coastal protection, biodiversity conservation, and sustainable livelihoods. Immediate and large-scale action is needed to protect and restore mangrove ecosystems, ensuring their benefits for both present and future generations.



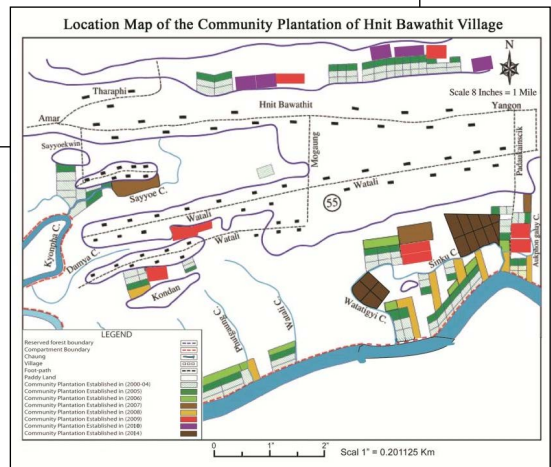
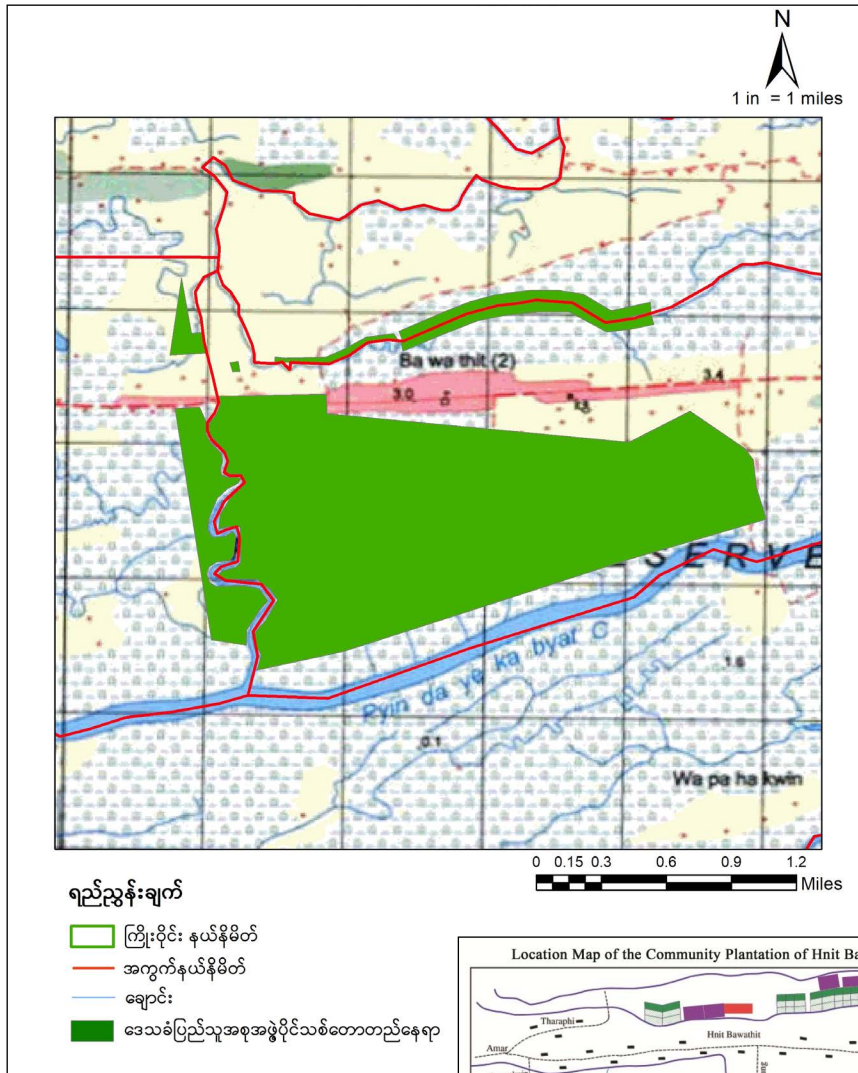
Attachment 1.

Location of the Community Forests in Pyindaye Reserved Forest, where FREDa ACTMANG Mangrove Ecosystems Restoration and Community Development Project Phase I to Phase V was implemented.



2 Ba Wa Thit Community Forest (800) acre

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2 Ba Wa Thit Community Forest 15°47' 5.45" N 95°22'17.54"E



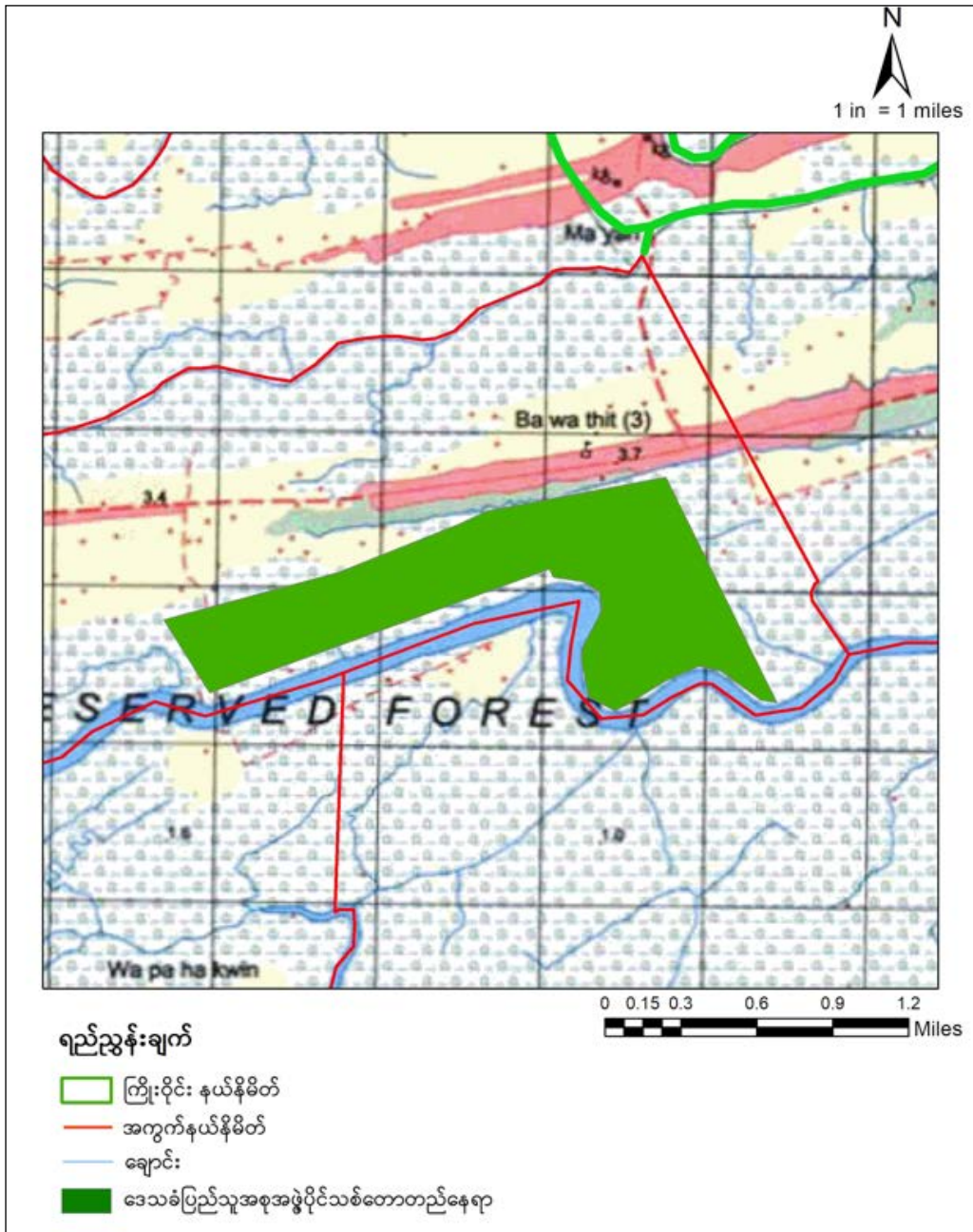
Ba Wa Thit U Tint Lwin 2023 15 47 20.64 15.78907 95 25 17.74 95.38382
5.78906666666667N95.38382E



3 Ba Wa Thit Community Forest 400 acre

Pyar Pon Township, Pyindaye Reserved Forest, Compartment 55,
15°46'49.89"N 95°23'29.08"E

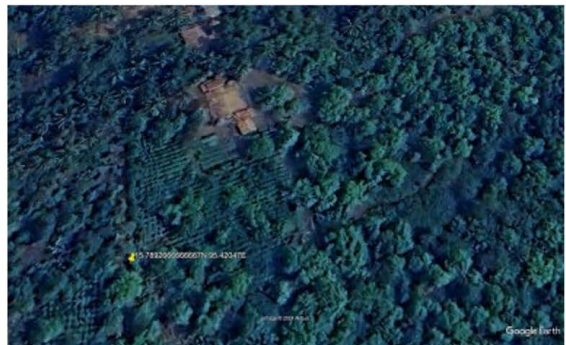
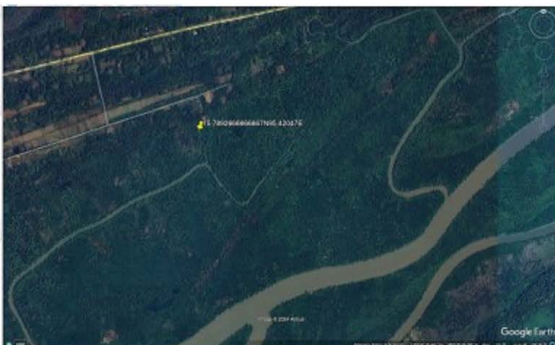
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3 Ba Wa Thit Community Forest 400 acre



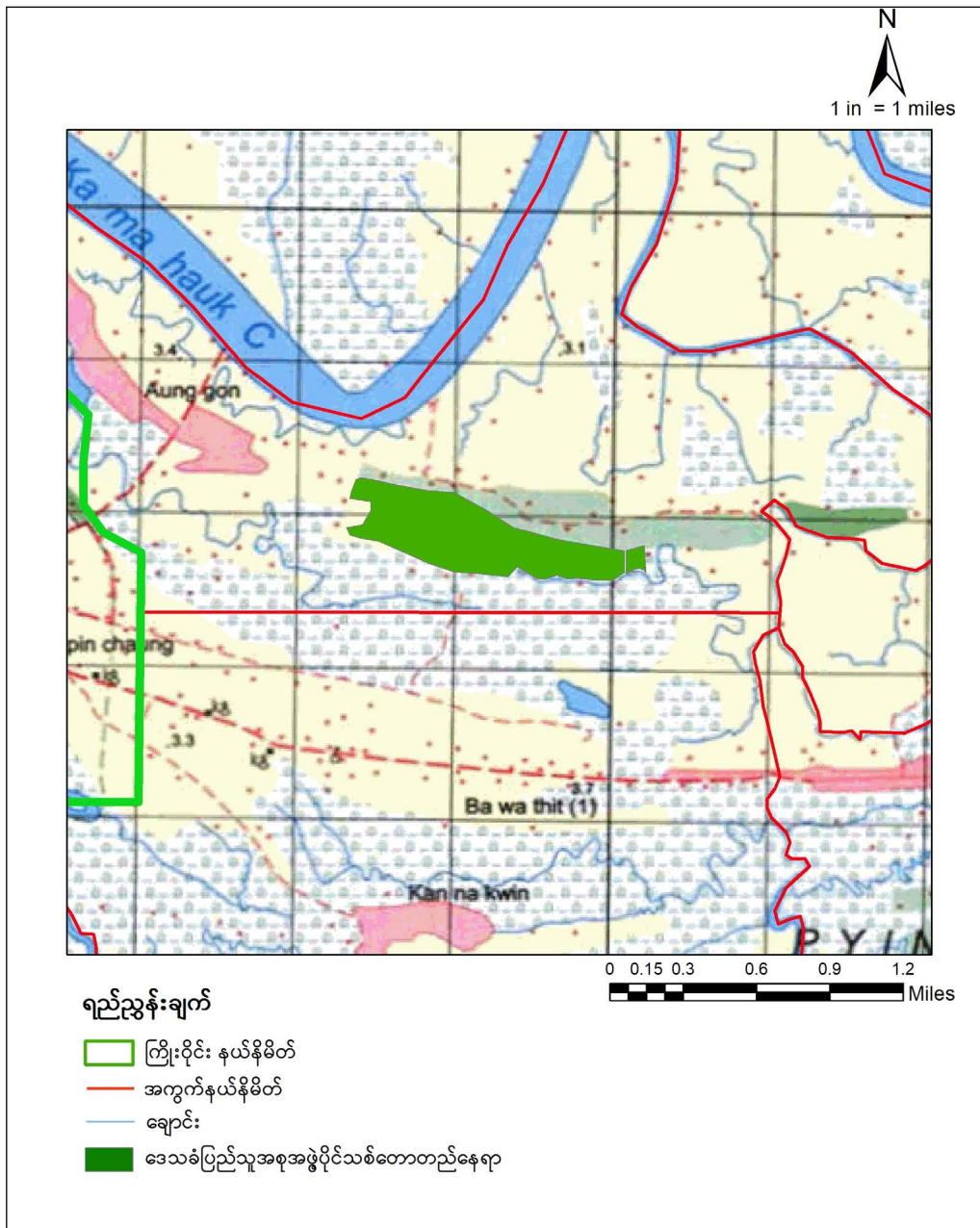
3 Ba Wa Thit U Aung Ko Latt/U Aung Htun Tint (2000) Lay Pin Chaung 15 47 21.36
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Aung Kone Community Forest,

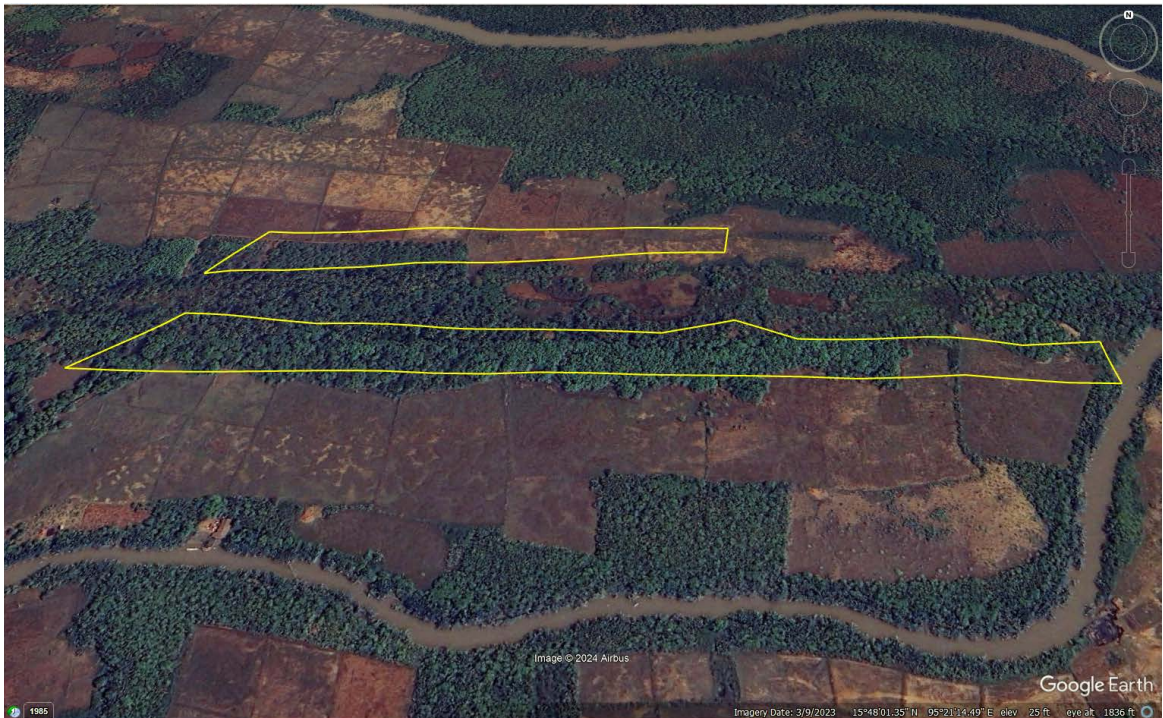
Pyindaye Reserved Forest Compartment 52, 15°48'01.35"N 95°21'14.49"E

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Aung Kone Community Forest, 169.6 acre,

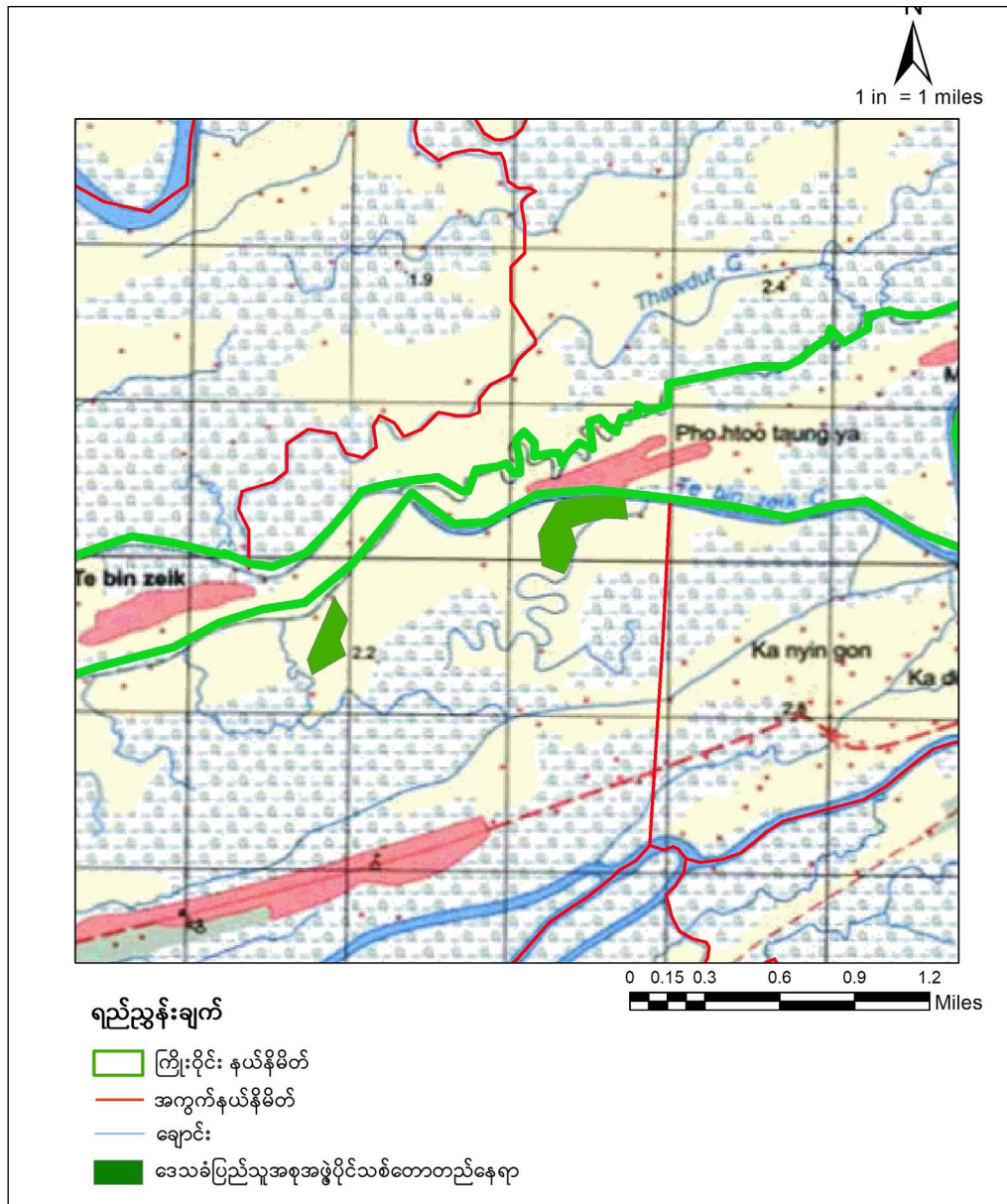
15°48'01.35"N 95°21'14.49", Compartment 52



A She Ma Yan / East Mayan CF, (47)acre,

Pyindaye Reserved forest, Compartment 56, 15°49'08.53"N95°26'54.83"E

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A She Ma Yan / East Mayan CF, (47)acre,

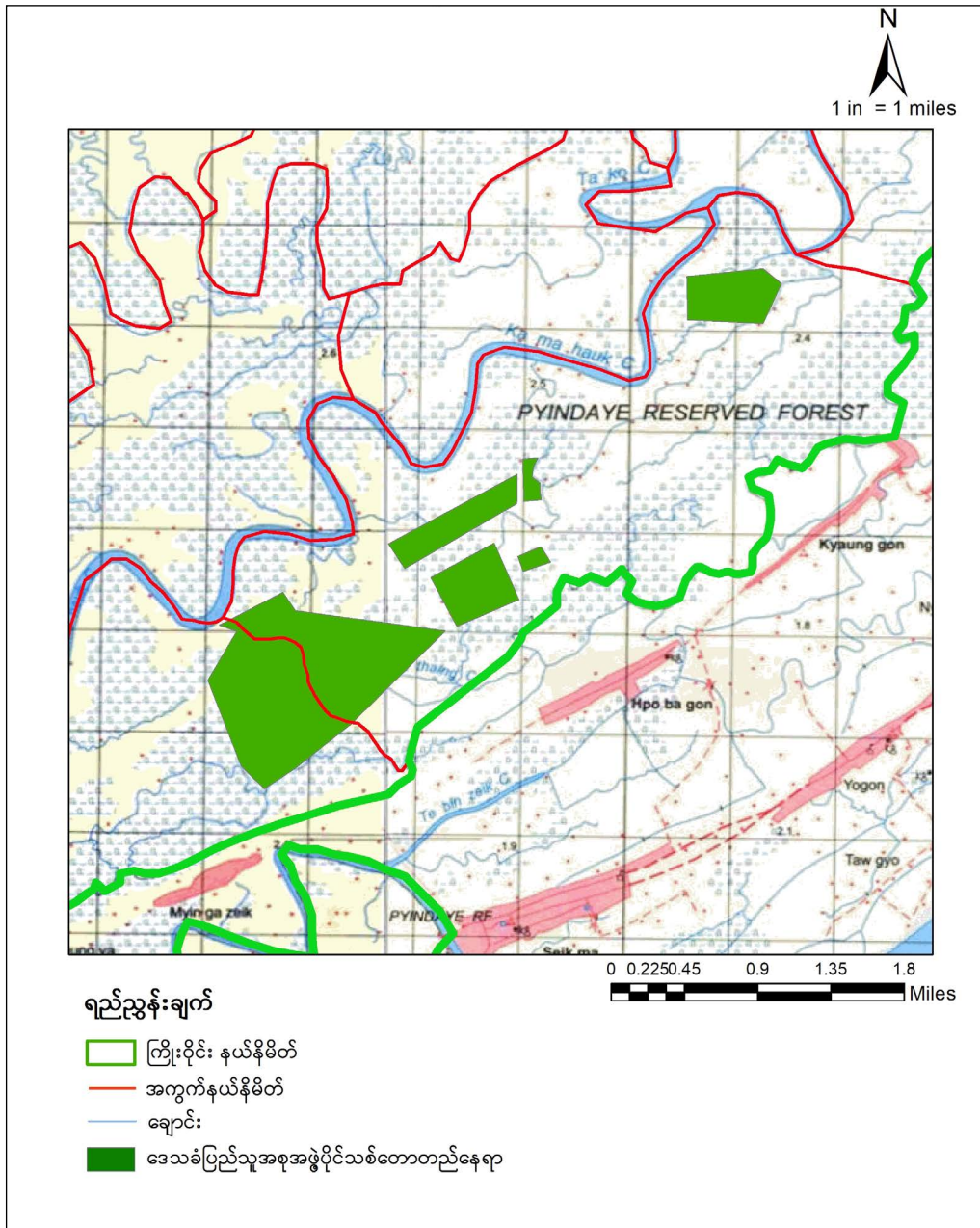
Pyindaye Reserved forest, Compartment 56, 15°49'08.53"N95°26'54.83"E



Bo Ba Kone Community Forest, 807.24 Acre,

Pyindaye Reserved Forest Compartment 46,47 (15°53'19.19"N 95°30'07.75"E)

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Bo Ba Kone Community Forest, 807.24 Acre,

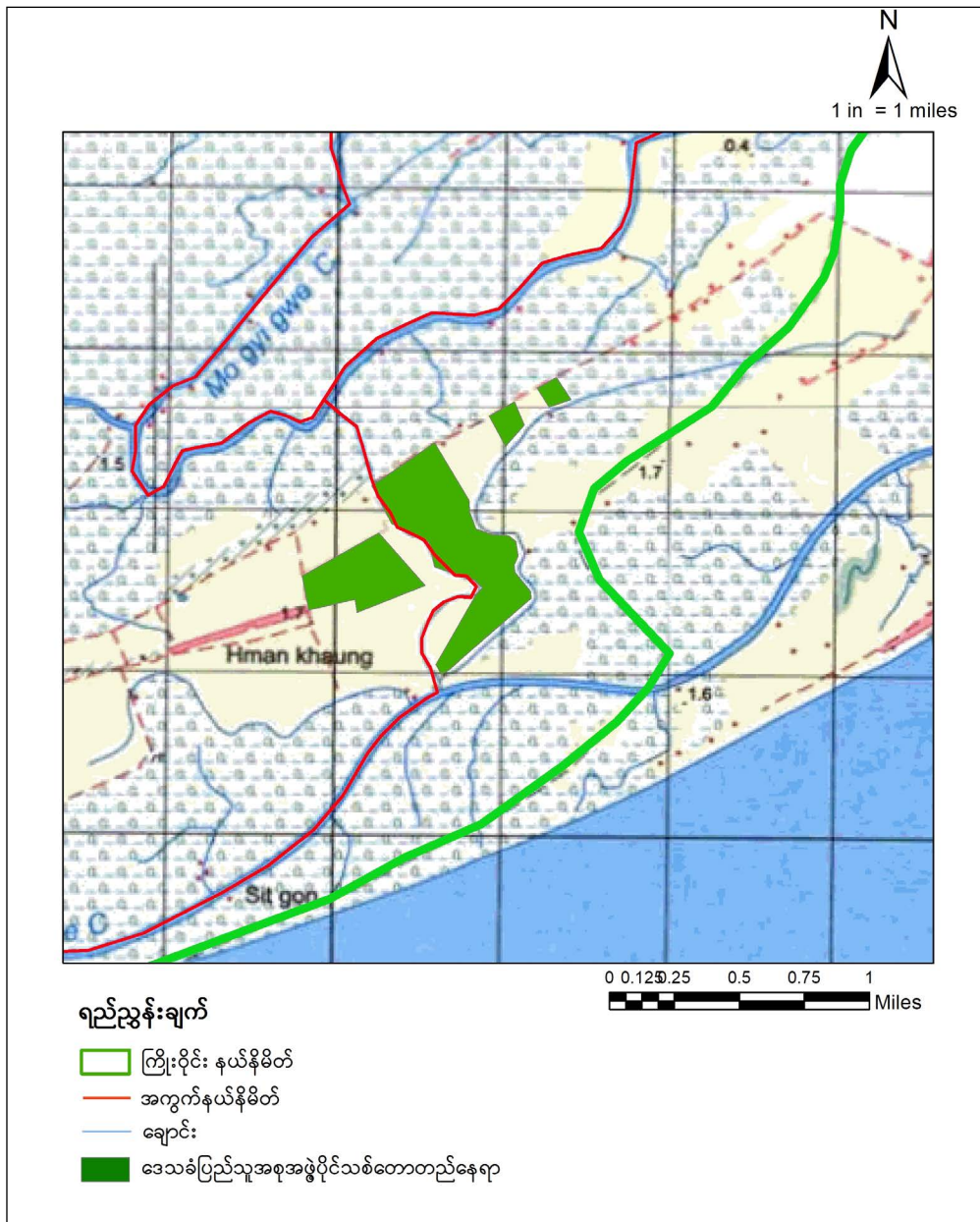
Pyindaye Reserved Forest Compartment 46,47 (15°53'19.19"N 95°30'07.75"E)



Htan Pin Kone Community Forest, (183) Acre,

Pyindaye Reserved Forest, Compartment 60, 61 (15°44'27.29"N 95°26'09.98"E)

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Htan Pin Kone Community Forest, (183) Acre,

Pyindaye Reserved Forest, Compartment 60, 61 (15°44'27.29"N 95°26'09.98"E)

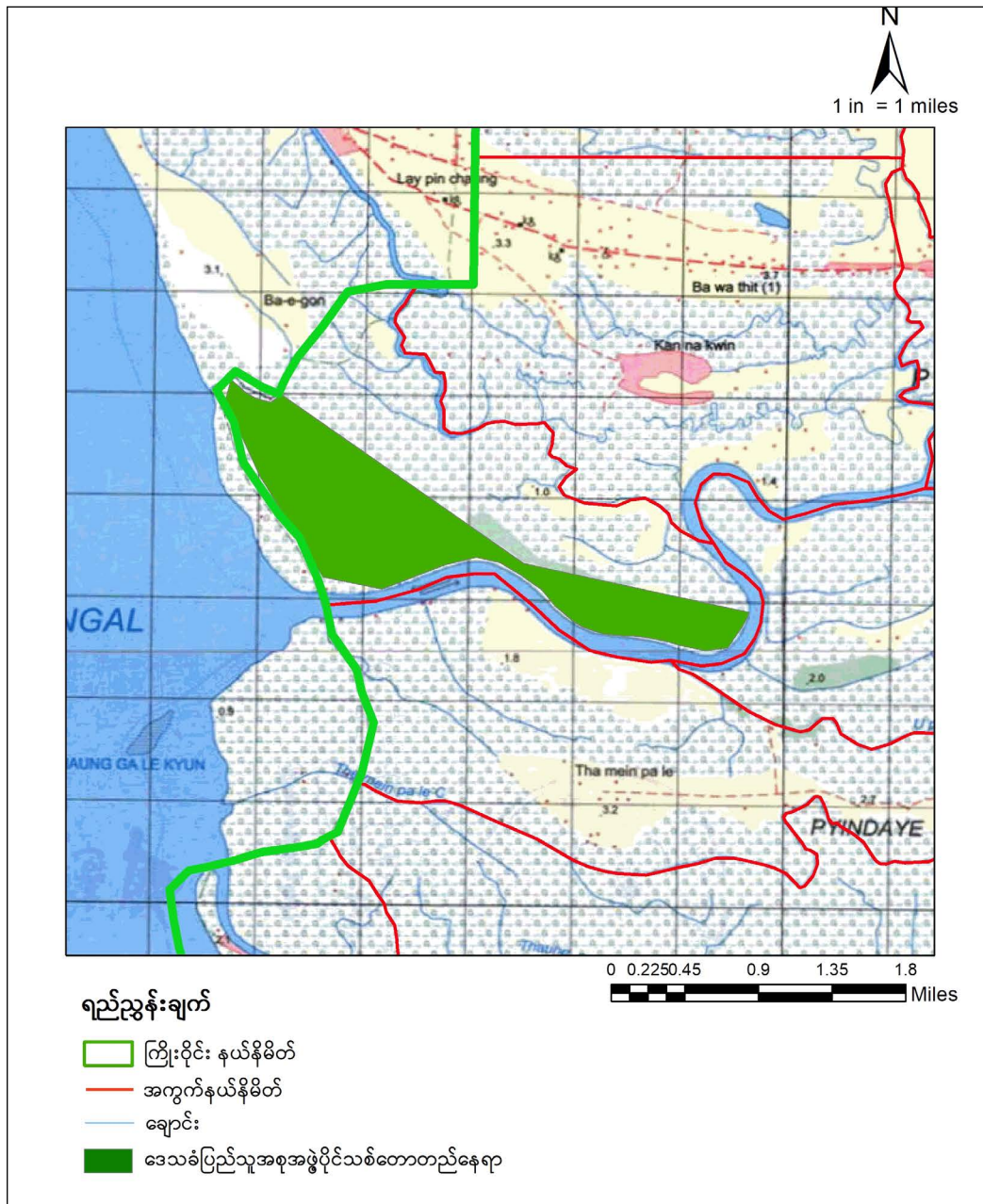


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Kan Gyi Ba Aye Kone Community Forest, (800) Acre,

Pyindaye Reserved Forest, Compartment 54, (15°45'44.27"N 95°17'45.33"E)

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ဧရိယာတိုင်းတာမှုပြမြေပုံ



Kan Gyi Ba Aye Kone Community Forest, (800) Acre,

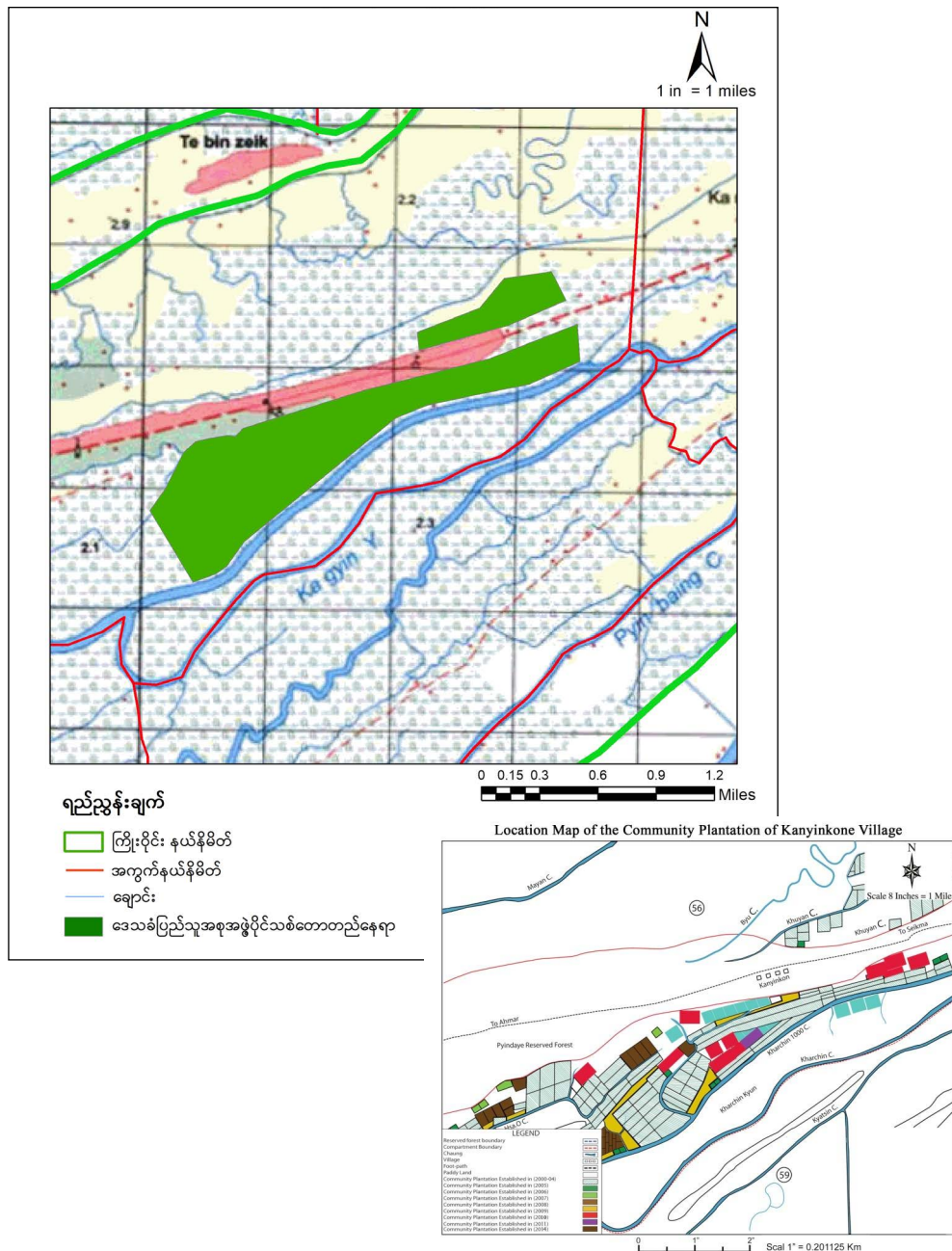
Pyindaye Reserved Forest, Compartment 54, (15°45'44.27"N 95°17'45.33"E)



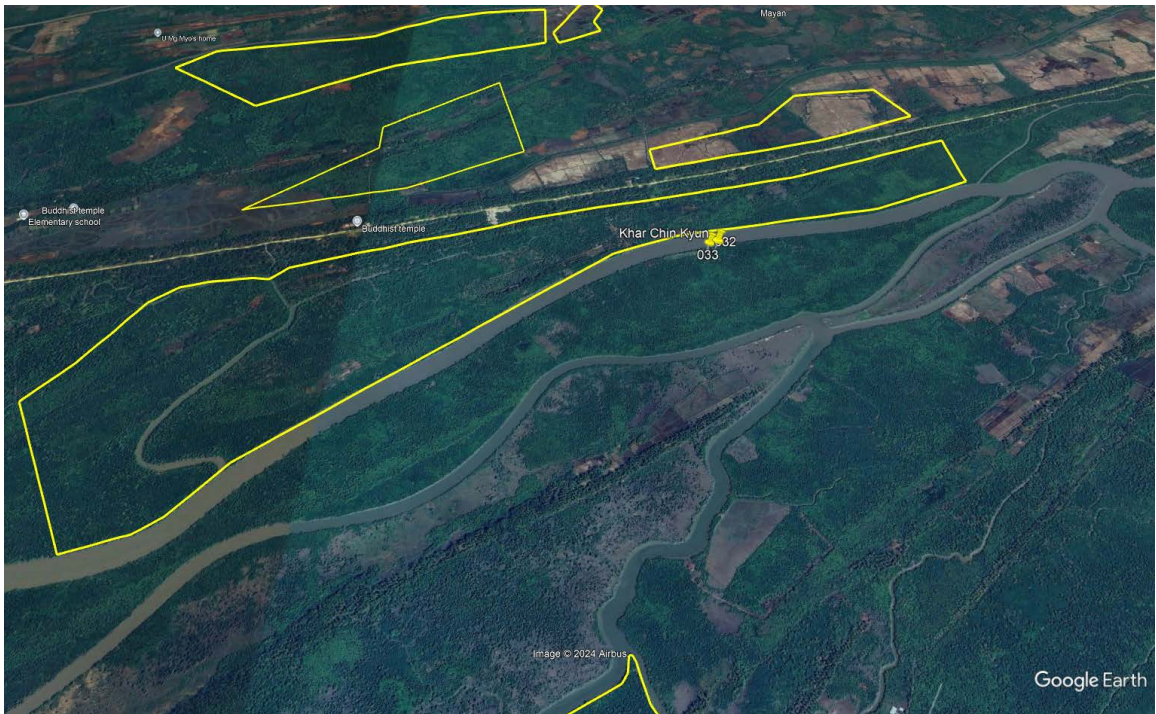
Ka Nyin Kone Community Forest, (400) acre,

Pyindaye Reserved Forest, Compartment (56)

ဖျာပုံမြို့နယ်၊ သစ်တောဦးစီးဌာန၊ ပြင်ဒရယ်ကြိုးဝိုင်း၊ အကွက်အမှတ် (၅၆) အတွင်း
ကညင်ကုန်းကျေးရွာ ဒေသခံပြည်သူ့အစုအဖွဲ့ပိုင်သစ်တော (၄၀၀) ဧက၏
ဧရိယာတိုင်းတာမှုပြမြေပုံ



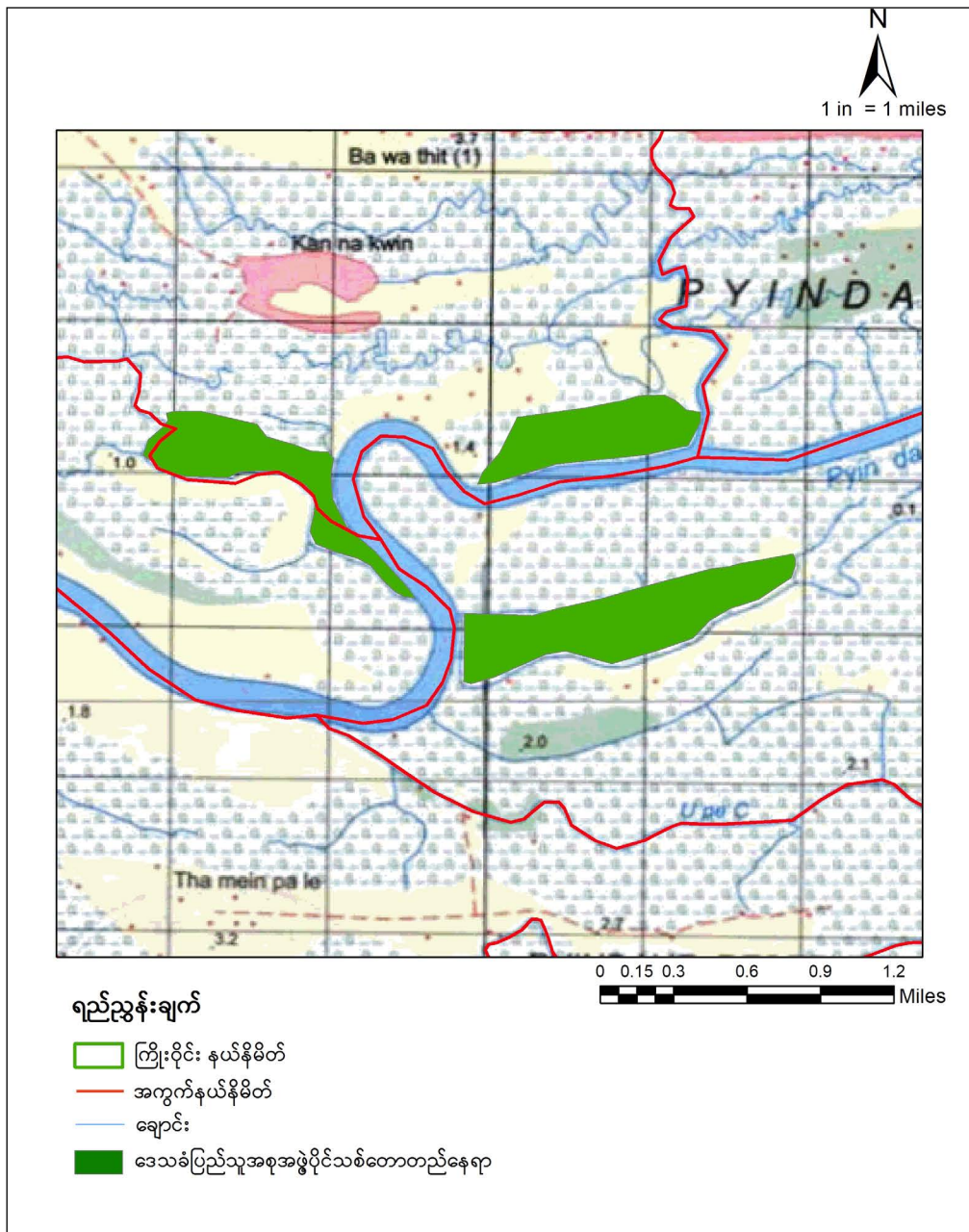
**Ka Nyin Kone Community Forest, (400) acre,
Pyindaye Reserved Forest, Compartment (56)**



Kannar Kwin Village Community Forest, (415) acre,

Pyindaye Reserved Forest Compartment 53, 62 (15°45'55.03"N 95°19'15.65"E

ဖျာပုံမြို့နယ်၊ သစ်တောဦးစီးဌာန၊ ပြင်ဒရယ်ကြိုးဝိုင်း၊ အကွက်အမှတ် (၅၃၊ ၆၂) အတွင်း
ကမ်းနားကွင်းကျေးရွာ ဒေသခံပြည်သူအစုအဖွဲ့ပိုင်သစ်တော (၄၁၅) ဧက၏
ဧရိယာတိုင်းတာမှုပြမြေပုံ

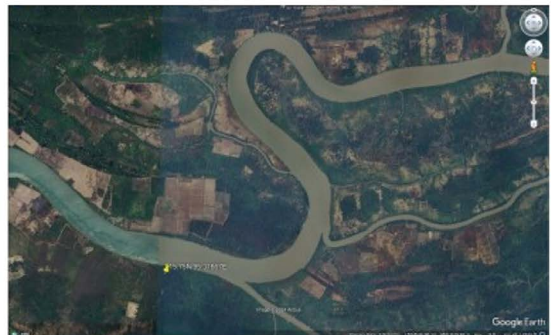
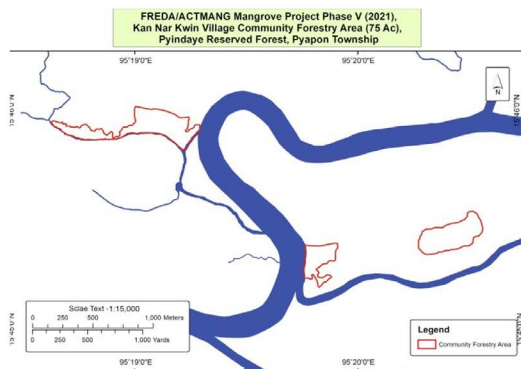


Kannar Kwin Village Community Forest, (415) acre,

Pyindaye Reserved Forest Compartment 53, 62(15°45'55.03"N 95°19'15.65"E



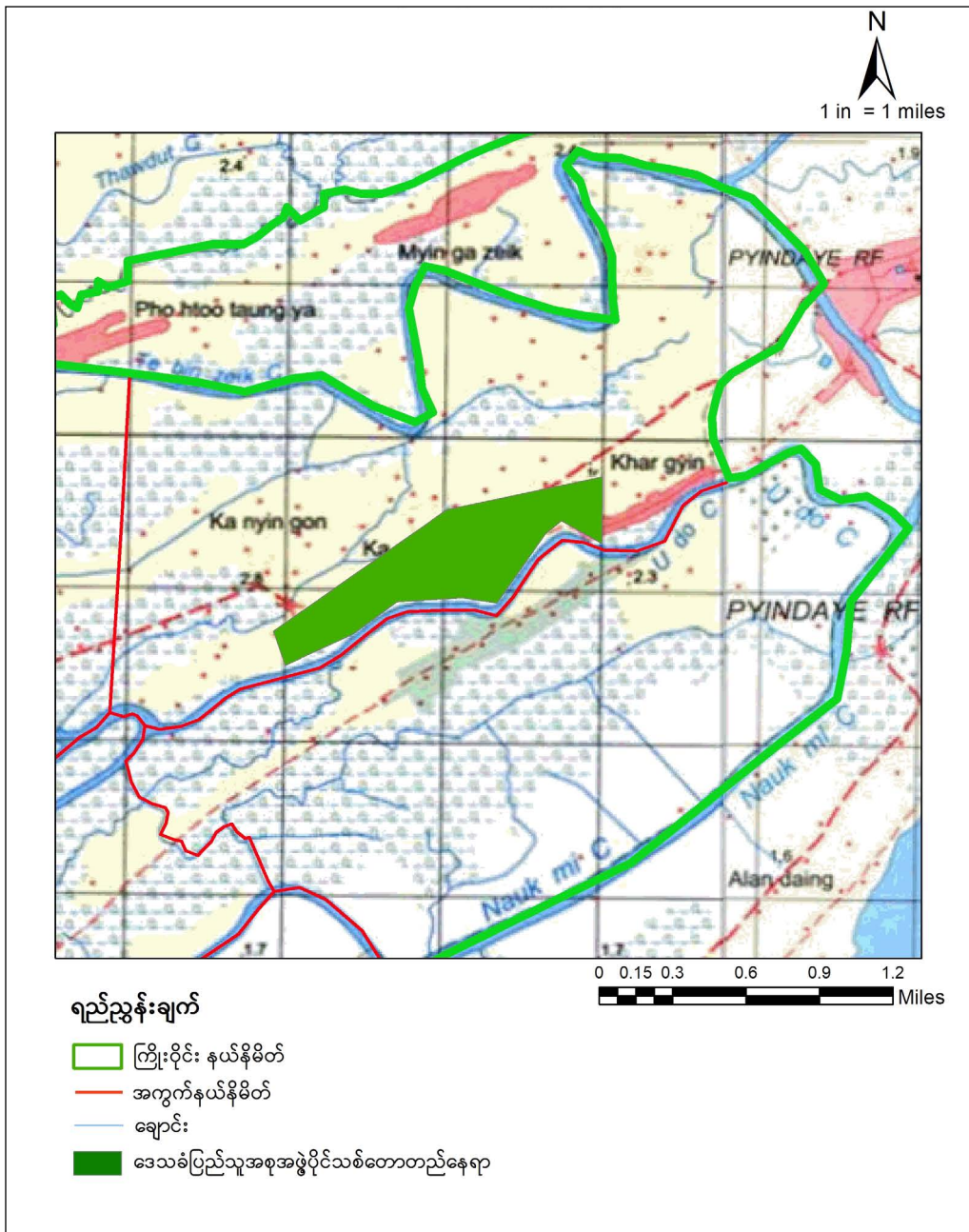
Kan Nar Kwin village Community Forest 95



Khar Chin village Community Forest, (150) Acre,

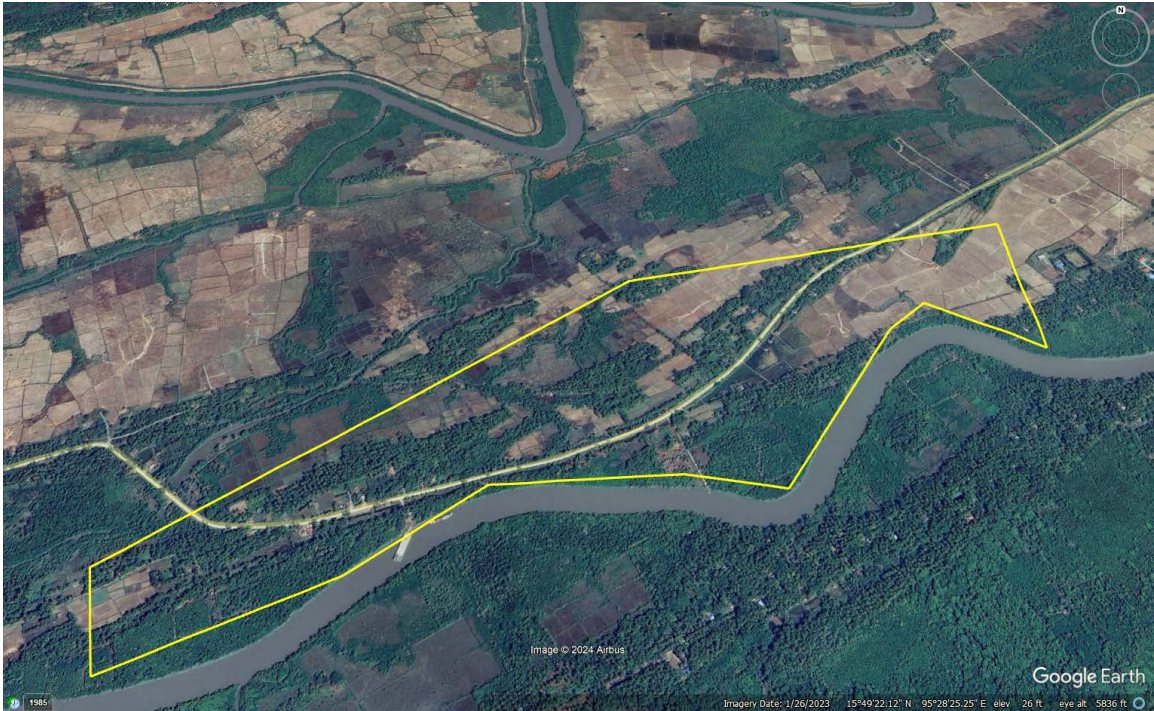
Pyindaye Reserved Forest Compartment (57) (15°48'25.9"N 95°29'0.59"E)

ဖျာပုံမြို့နယ်၊ သစ်တောဦးစီးဌာန၊ ပြင်ဒရယ်ကြိုးဝိုင်း၊ အကွက်အမှတ် (၅၇) အတွင်း
ခါချဉ်ကျေးရွာ ဒေသခံပြည်သူ့အစုအဖွဲ့ပိုင်သစ်တော (၁၅၀) ဧက၏
ဧရိယာတိုင်းတာမှုပြမြေပုံ



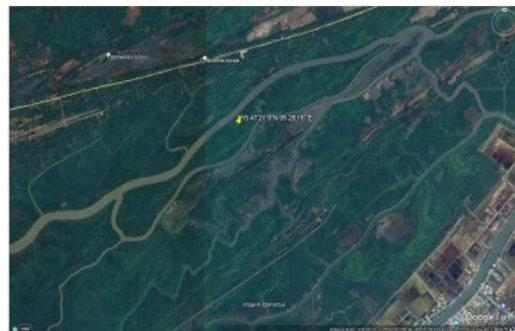
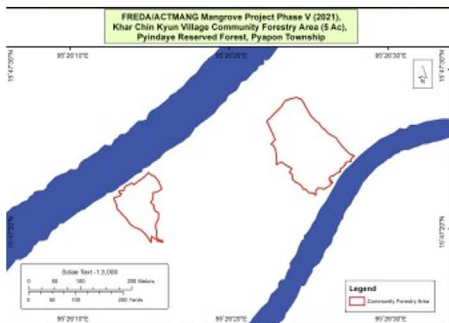
Khar Chin village Community Forest, (150) Acre,

Pyindaye Reserved Forest Compartment (57) (15°48'25.9"N 95°29'0.59"E)



**FREDA/ACTMANG Mangrove Project Phase V (2021),
Khar Chin Kyun Village Community Forestry Area (5 Ac),
Pyindaye Reserved Forest, Pyapon Township**

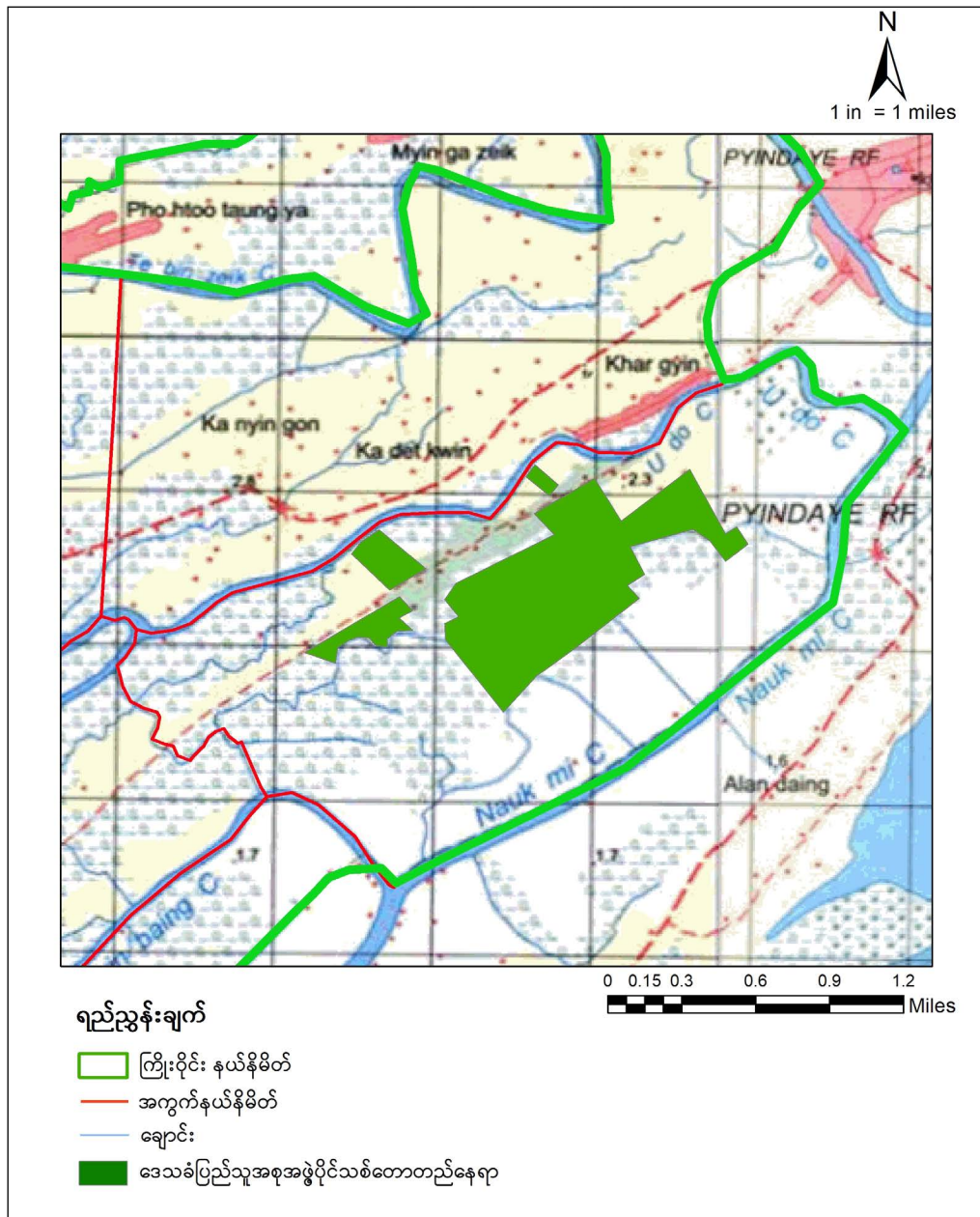
15.47219 N 95.2618E



Kwe tee(2 Community Forest), (309) Acre,

Pyindaye Reserved Forest, Compartment (58)(15°47'43.55"N95°29'03.72"E

ဖျာပုံမြို့နယ်၊ သစ်တောဦးစီးဌာန၊ ပြင်ဒရယ်ကြိုးဝိုင်း၊ အကွက်အမှတ် (၅၈) အတွင်း
ကျွဲတဲကျေးရွာ ဒေသခံပြည်သူအစုအဖွဲ့ပိုင်သစ်တော (၃၀၉) ဧက၏
ဧရိယာတိုင်းတာမှုပြမြေပုံ

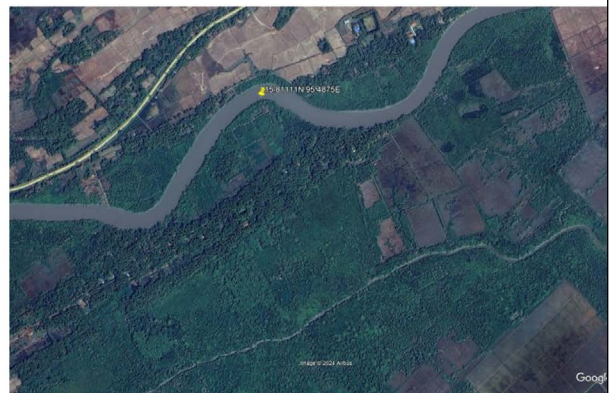
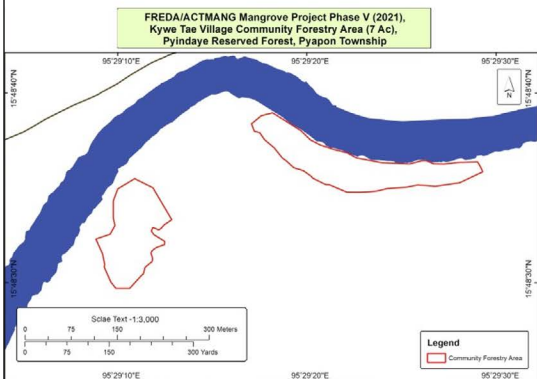


Kwe tee(2 Community Forest), (309) Acre,

Pyindaye Reserved Forest, Compartment (58)(15°47'43.55"N95°29'03.72"E



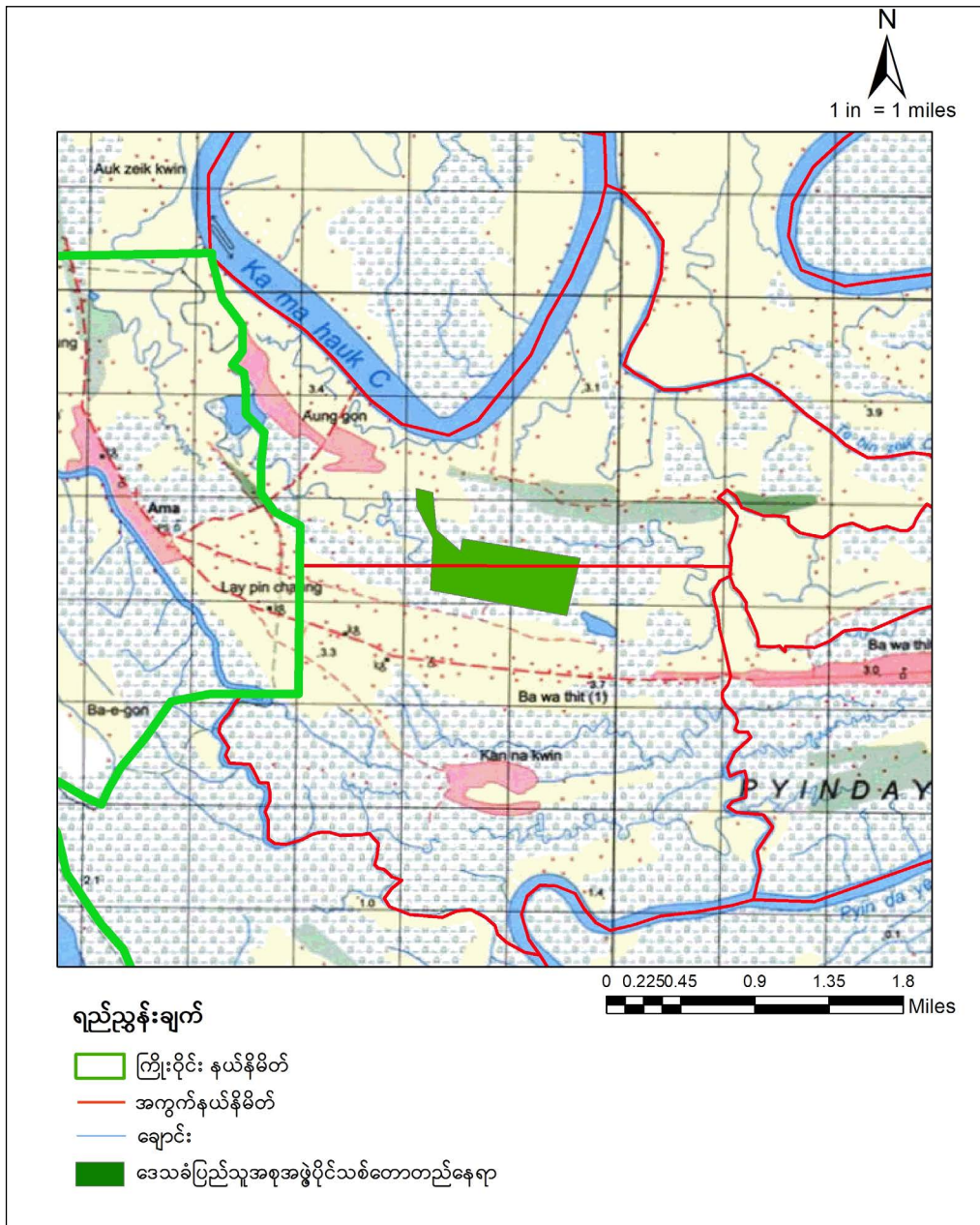
Kywe Tae CF



Lay Pin Chaung Community Forest(110) Acre,

Pyindaye Reserved Forest Compartment 52, 53) (15°47'26.11"N95°19'03.26"E

ဖျာပုံမြို့နယ်၊ သစ်တောဦးစီးဌာန၊ ပြင်ဒရယ်ကြိုးဝိုင်း၊ အကွက်အမှတ် (၅၂၊ ၅၃) အတွင်း
လေးပင်ချောင်ကျေးရွာ ဒေသခံပြည်သူ့အစုအဖွဲ့ပိုင်သစ်တော (၁၁၀) ဧက၏
ဧရိယာတိုင်းတာမှုပြမြေပုံ



Lay Pin Chaung Community Forest(110) Acre,

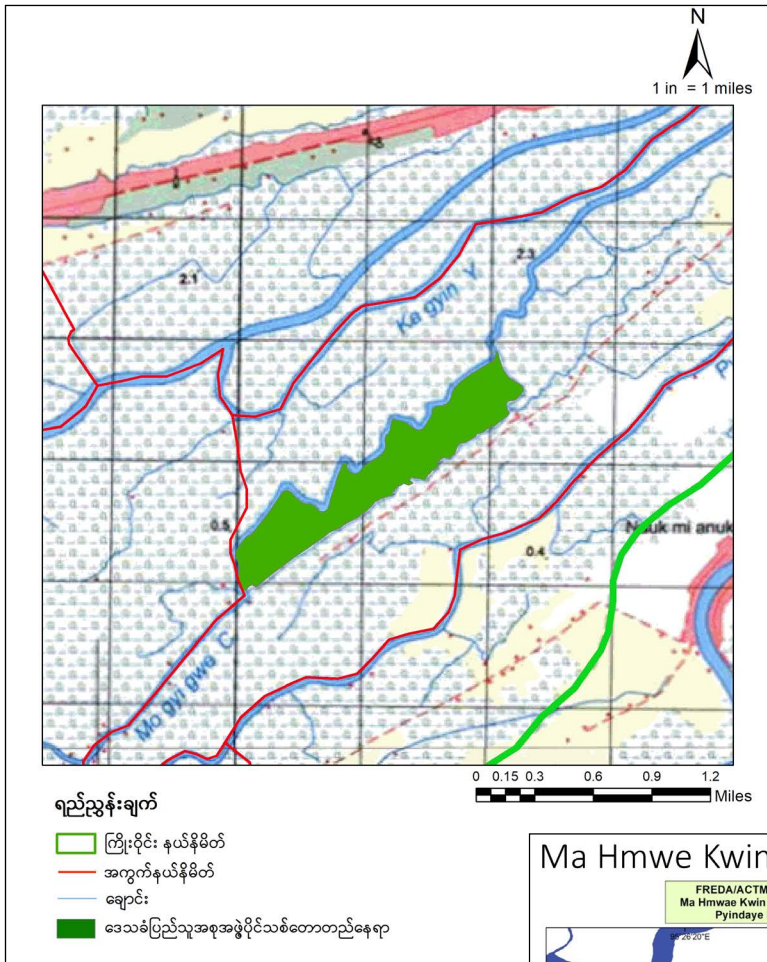
Pyindaye Reserved Forest Compartment 52, 53) (15°47'26.11"N95°19'03.26"E



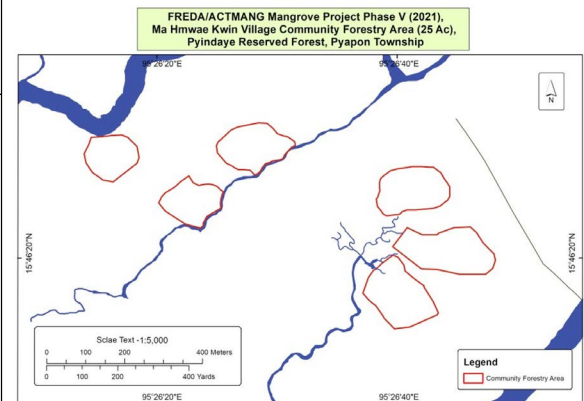
Ma Hmwe Kwin (2 Community Forest), 251 Acre,

Pyindaye Reserved Forest Compartment (59) 15°46'31.88"N95°26'08.77"E

ဖျာပုံမြို့နယ်၊ သစ်တောဦးစီးဌာန၊ ပြင်ဒရယ်ကြိုးဝိုင်း၊ အကွက်အမှတ် (၅၉) အတွင်း
မမွေးကင်းကျေးရွာ ဒေသခံပြည်သူ့အစုအဖွဲ့ပိုင်သစ်တော (၂၅၁) ဧက၏
ဧရိယာတိုင်းတာမှုပြမြေပုံ

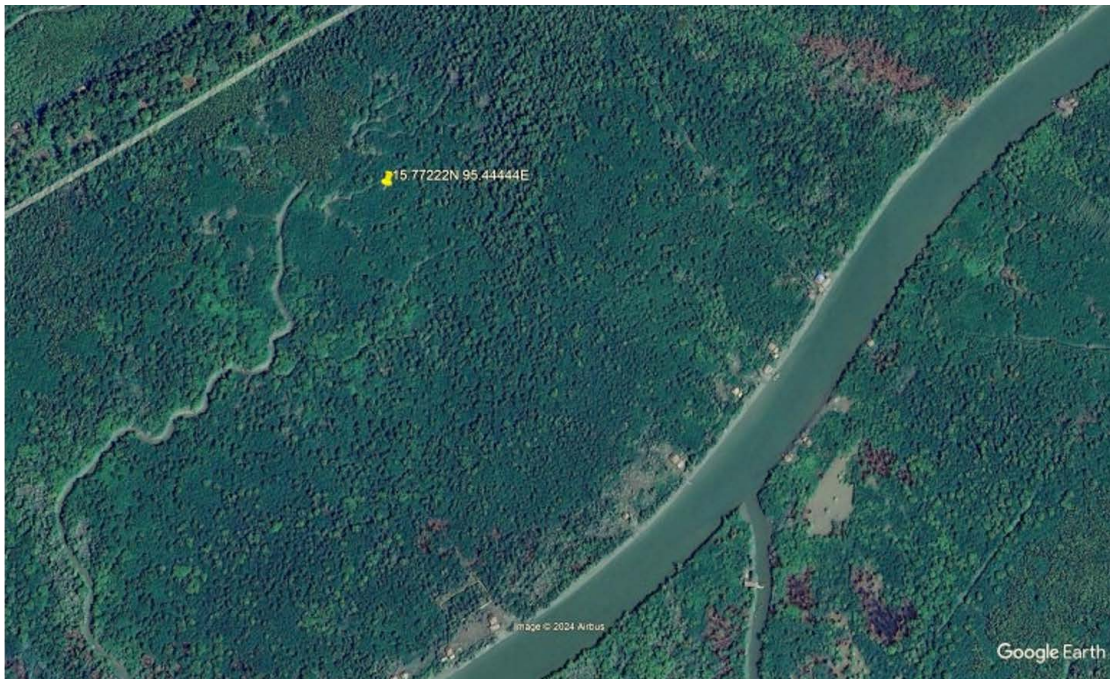


Ma Hmwe Kwin CF 15.77222N95.44444E



Ma Hmwe Kwin (2 Community Forest), 251 Acre,

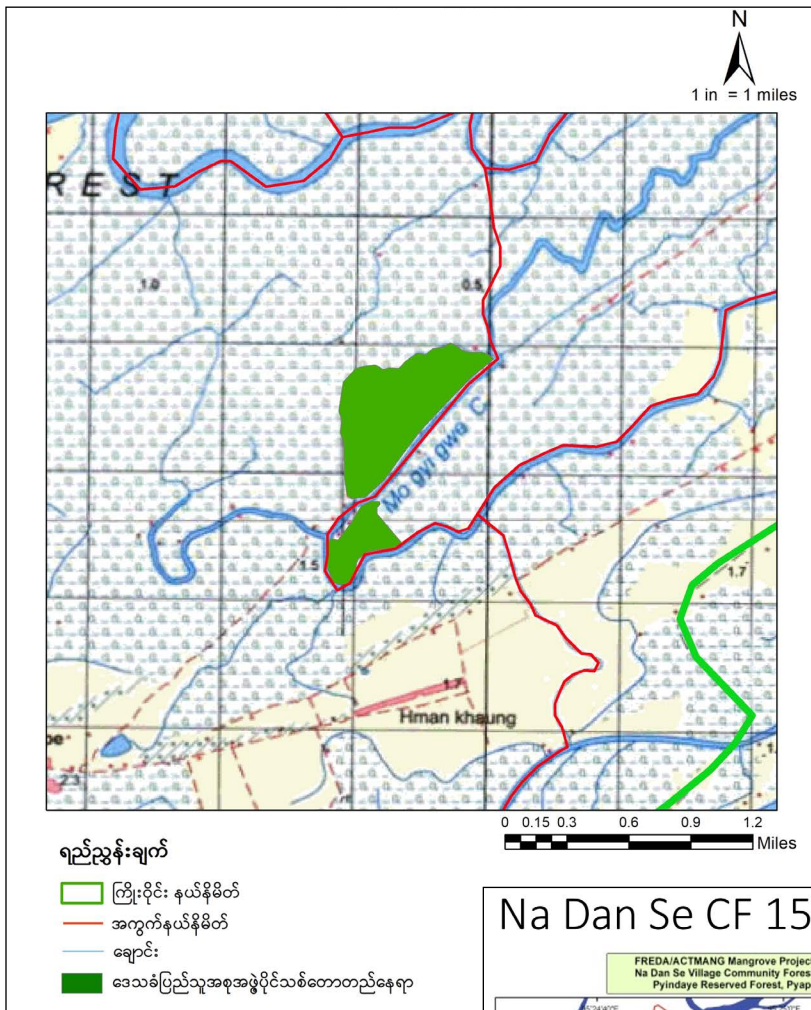
Pyindaye Reserved Forest Compartment (59) 15°46'31.88"N 95°26'08.77"E



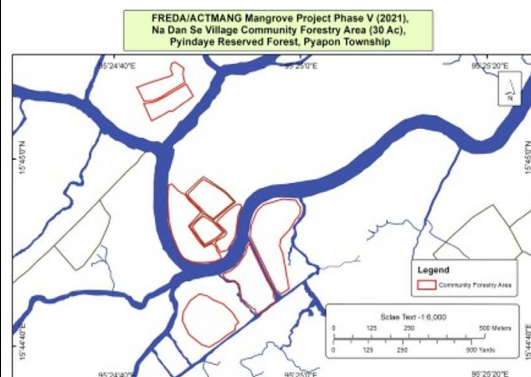
Nga Tan Se Community Forest (218) Acre,

Pyindaye Reserved Forest, Compartment 59,61) 15°44'49.12"N 95°24'47.48"E

ဖျာပုံမြို့နယ်၊ သစ်တောဦးစီးဌာန၊ ပြင်ဒရယ်ကြိုးဝိုင်း၊ အကွက်အမှတ် (၅၉၊ ၆၁) အတွင်း
ငါးဒန်ဆည်ကျေးရွာ ဒေသခံပြည်သူ့အစုအဖွဲ့ပိုင်သစ်တော (၂၈၁) ဧက၏
ဧရိယာတိုင်းတာမှုပြမြေပုံ

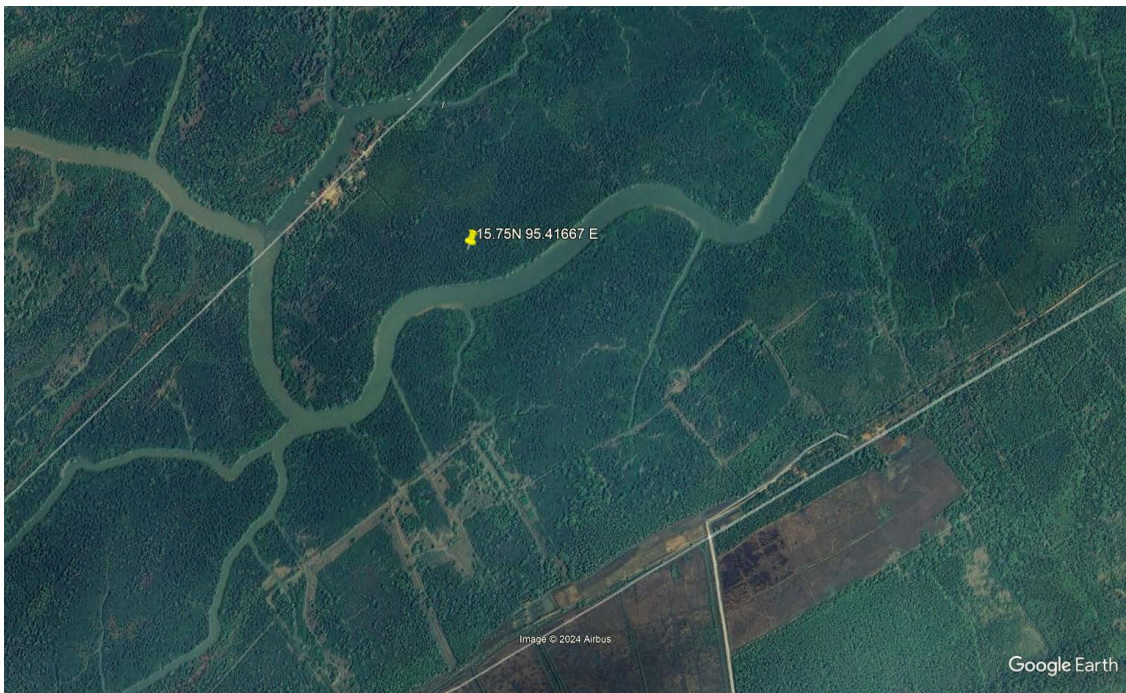
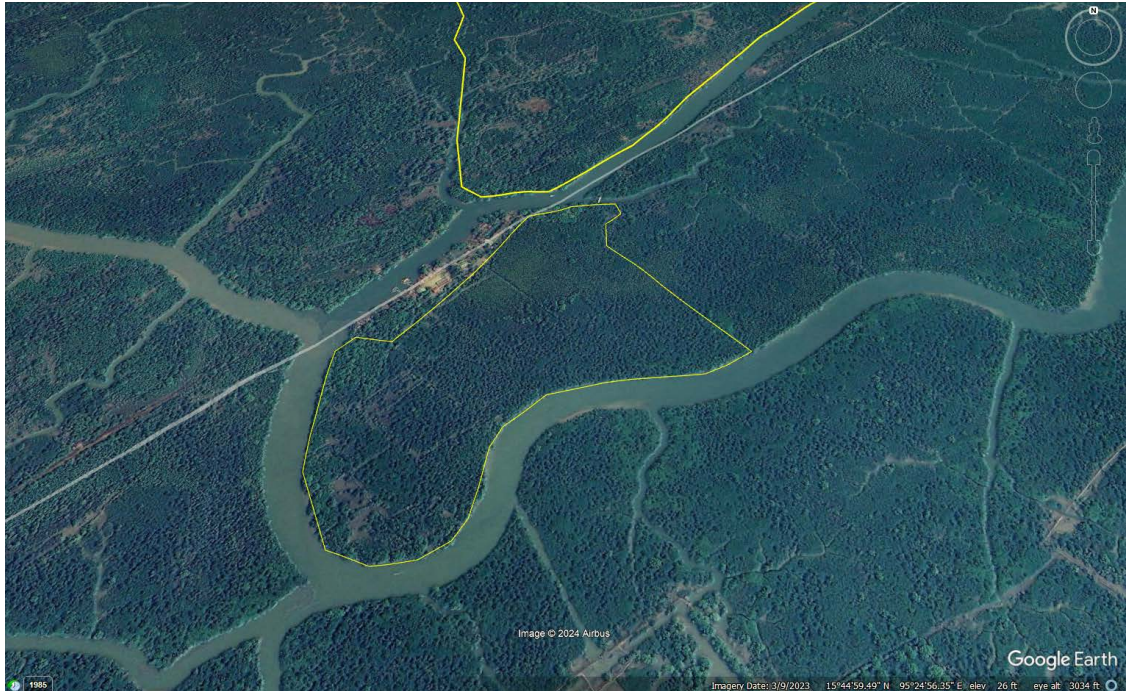


Na Dan Se CF 15 45 0 N 95 25 0 E



Nga Tan Se Community Forest (218) Acre,

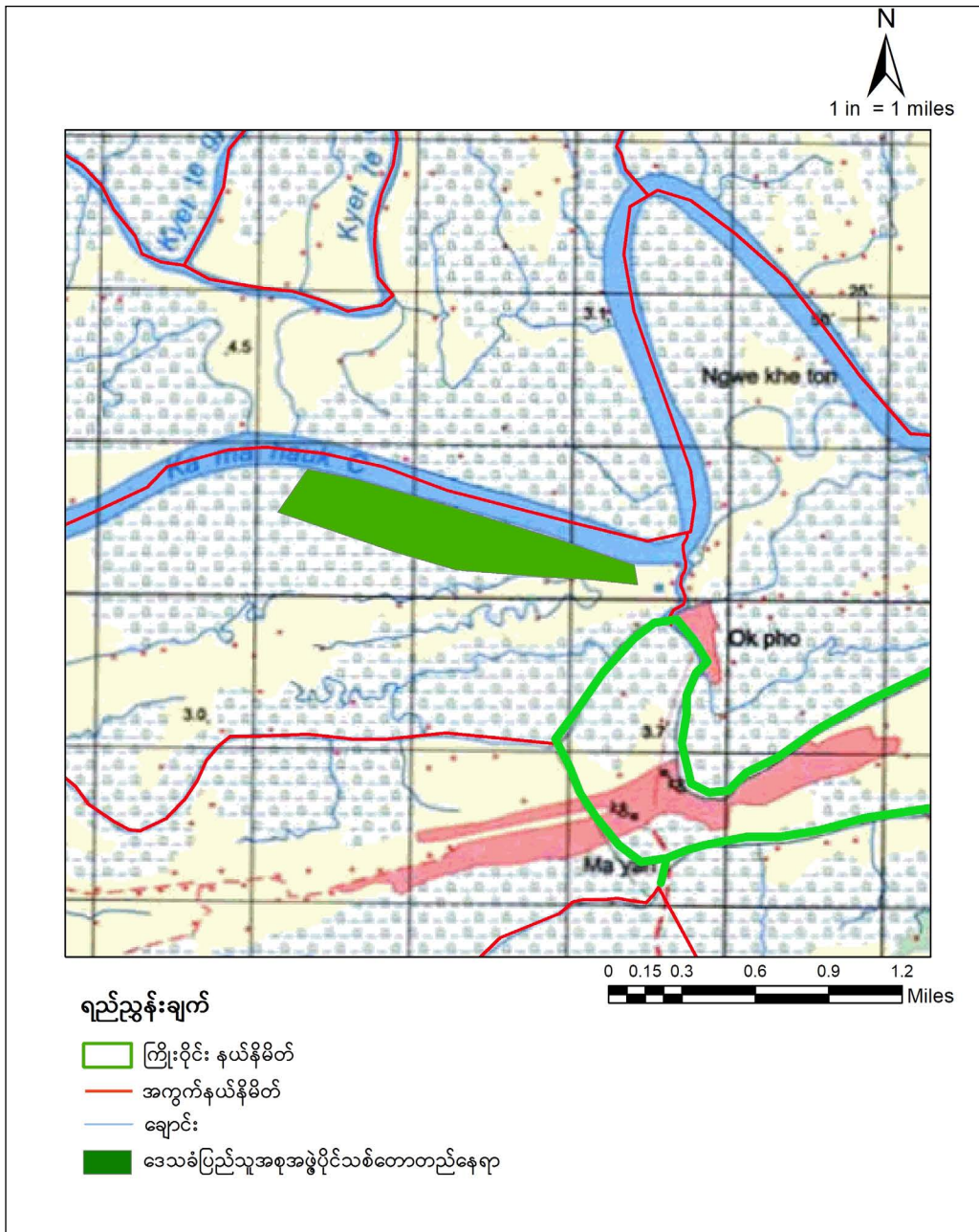
Pyindaye Reserved Forest, Compartment 59,61) 15°44'49.12"N95°24'47.48"E



Oak Pho Kwin Chaung Community Forest, (175) acre,

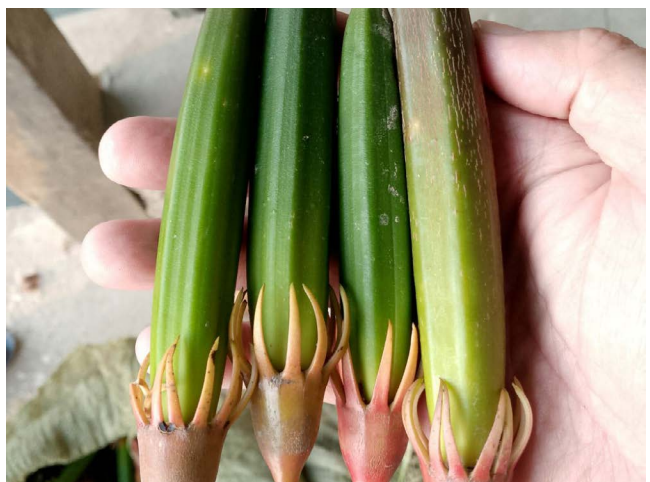
Pyindaye reserved forest, compartment (49)

ဖျာပုံမြို့နယ်၊ သစ်တောဦးစီးဌာန၊ ပြင်ဒရယ်ကြိုးဝိုင်း၊ အကွက်အမှတ် (၄၉) အတွင်း
အုတ်ဖိုကွင်းချောင်းကျေးရွာ ဒေသခံပြည်သူအစုအဖွဲ့ပိုင်သစ်တော (၁၇၅) ဧက၏
ဧရိယာတိုင်းတာမှုပြမြေပုံ



Oak Pho Kwin Chaung Community Forest, (175) acre,

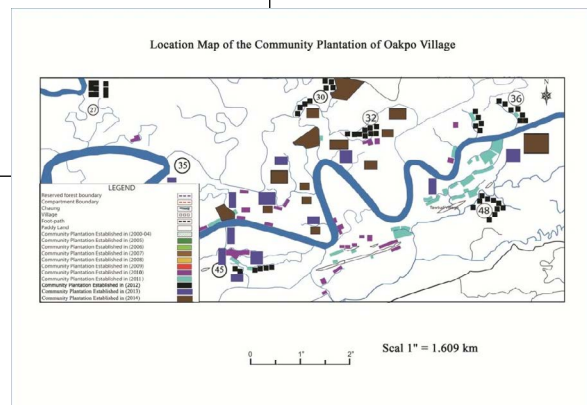
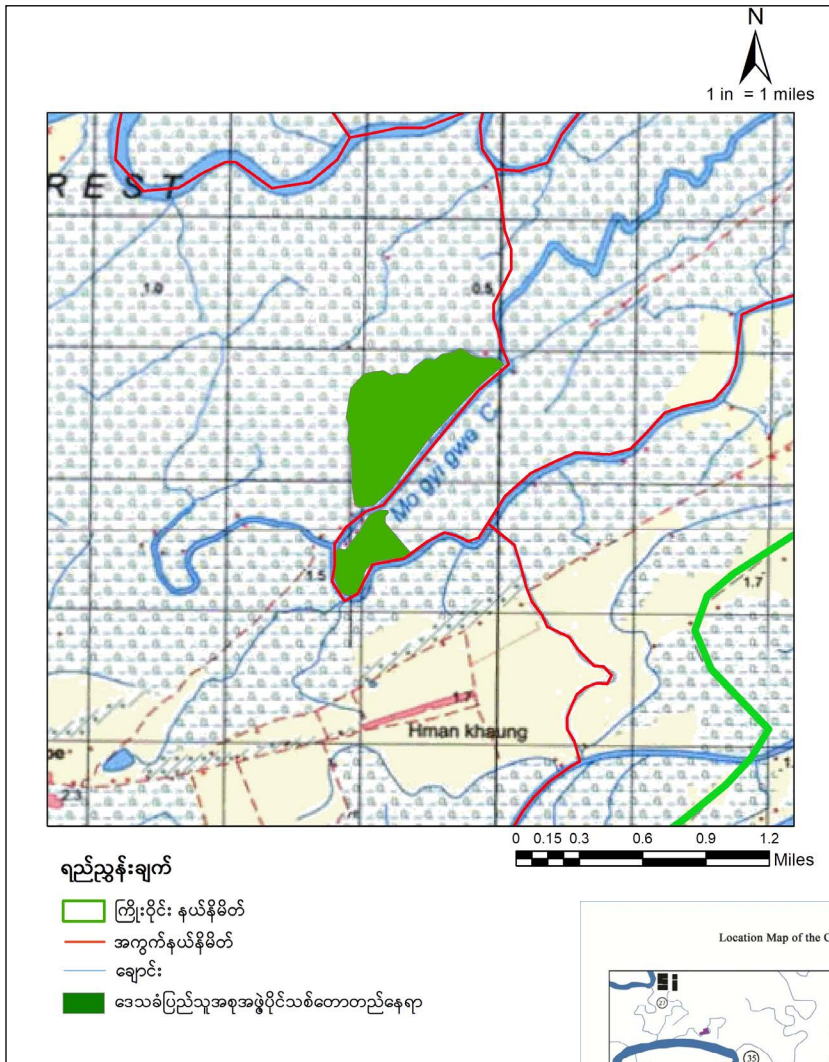
Pyindaye reserved forest, compartment (49)



Oak Pho Kwin Chaung Community Forests(282) acre,

Pyindaye Reserved Forest Compartment 31,32,48,49

ဖျာပုံမြို့နယ်၊ သစ်တောဦးစီးဌာန၊ ပြင်ဒရယ်ကြိုးဝိုင်း၊ အကွက်အမှတ် (၃၁၊ ၃၂၊ ၄၈၊ ၄၉) အတွင်း
အုတ်ဖိုကွင်းချောင်းကျေးရွာ ဒေသခံပြည်သူအစုအဖွဲ့ပိုင်သစ်တော (၂၈၂) ဧက၏
ဧရိယာတိုင်းတာမှုပြမြေပုံ

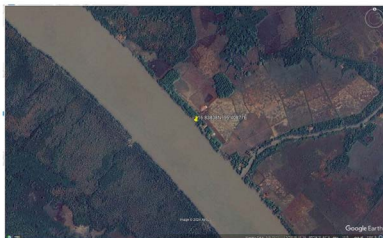


Oak Pho Kwin Chaung Community Forests(282) acre,

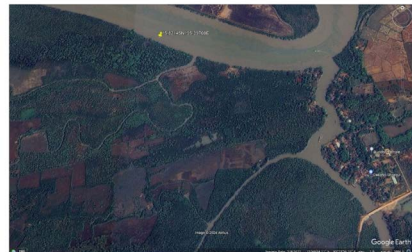
Pyindaye Reserved Forest Compartment 31,32,48,49



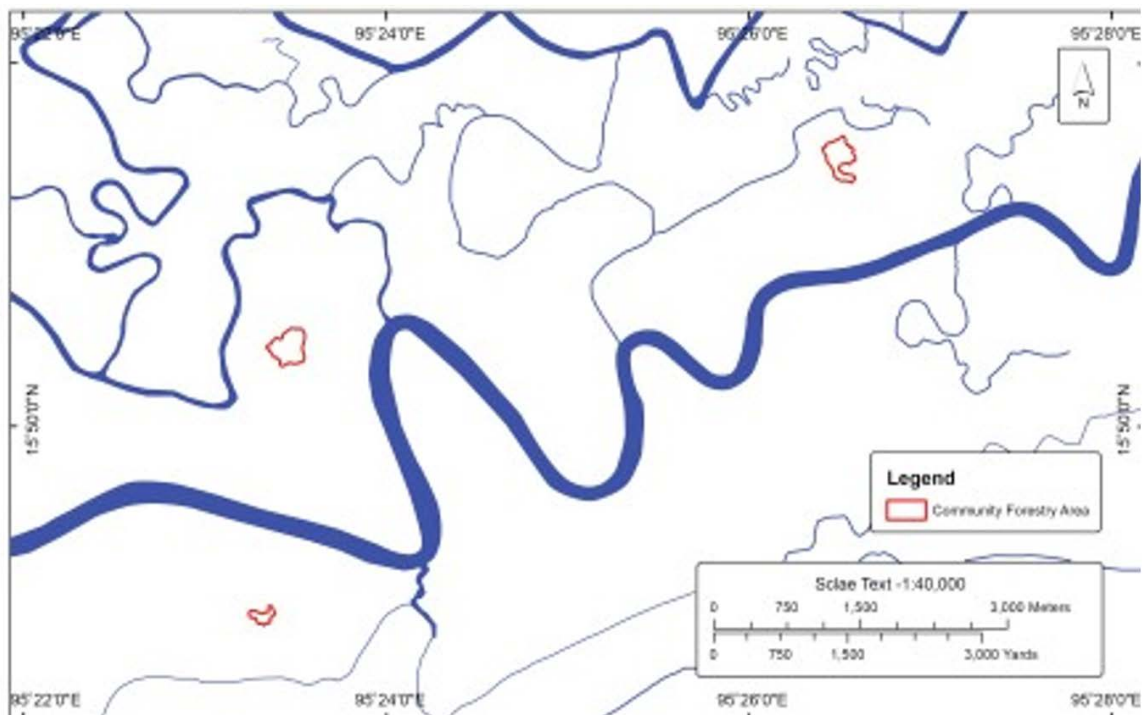
Oak-Pho, Gawdu 2017 Plantation N $15^{\circ} 50' 18.16'' = 15.83838$, E $95^{\circ} 24' 31.56'' = 95.40877$



Sin Thay Chaung Plantation (99/2000) Oak Pho N $15^{\circ} 49' 17.23'' = 15.82145$ E $95^{\circ} 23' 49.50'' = 95.39708$



**FREDA/ACTMANG Mangrove Project Phase V (2021),
Oakpo Kwin Chaung Village Community Forestry Area (50 Ac),
Pyindaye Reserved Forest, Pyapon Township**



Oakpo Kwin Chaung CF 15 50 N 95
260 E

**FREDA/ACTMANG Mangrove Project Phase V (2021),
Oakpo Kwin Chaung Village Community Forestry Area (50 Ac),
Pyindaye Reserved Forest, Pyapon Township**

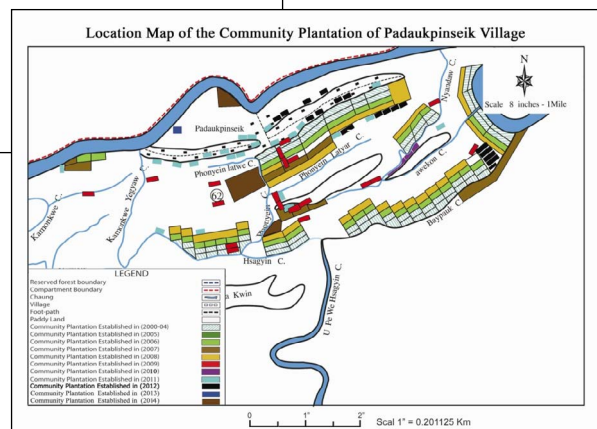
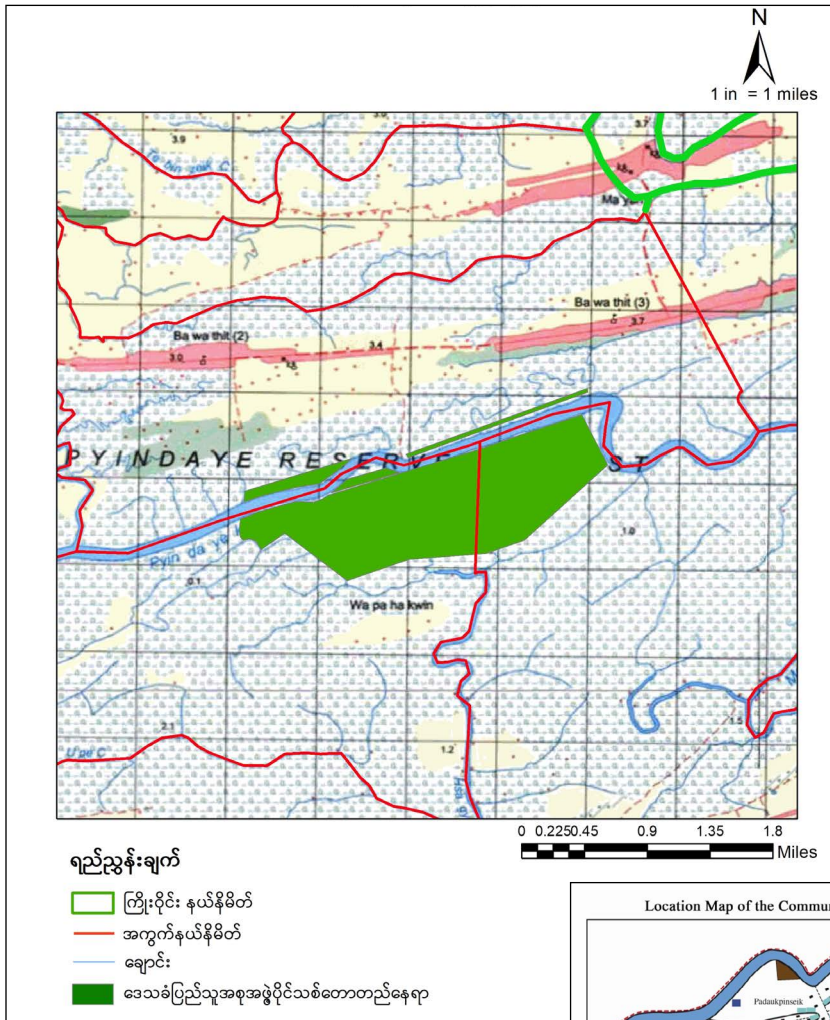
15.83333N95.43333E



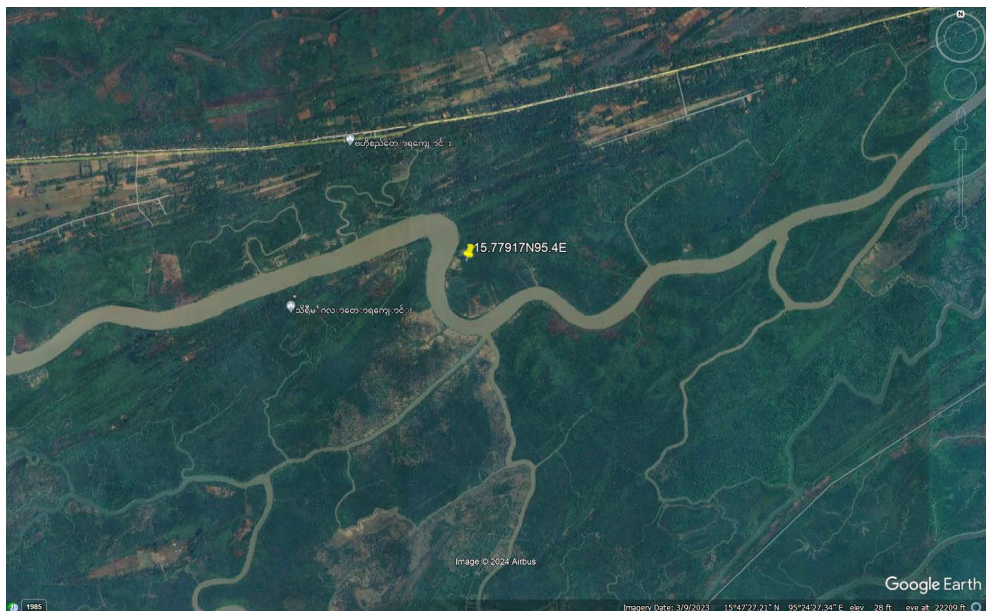
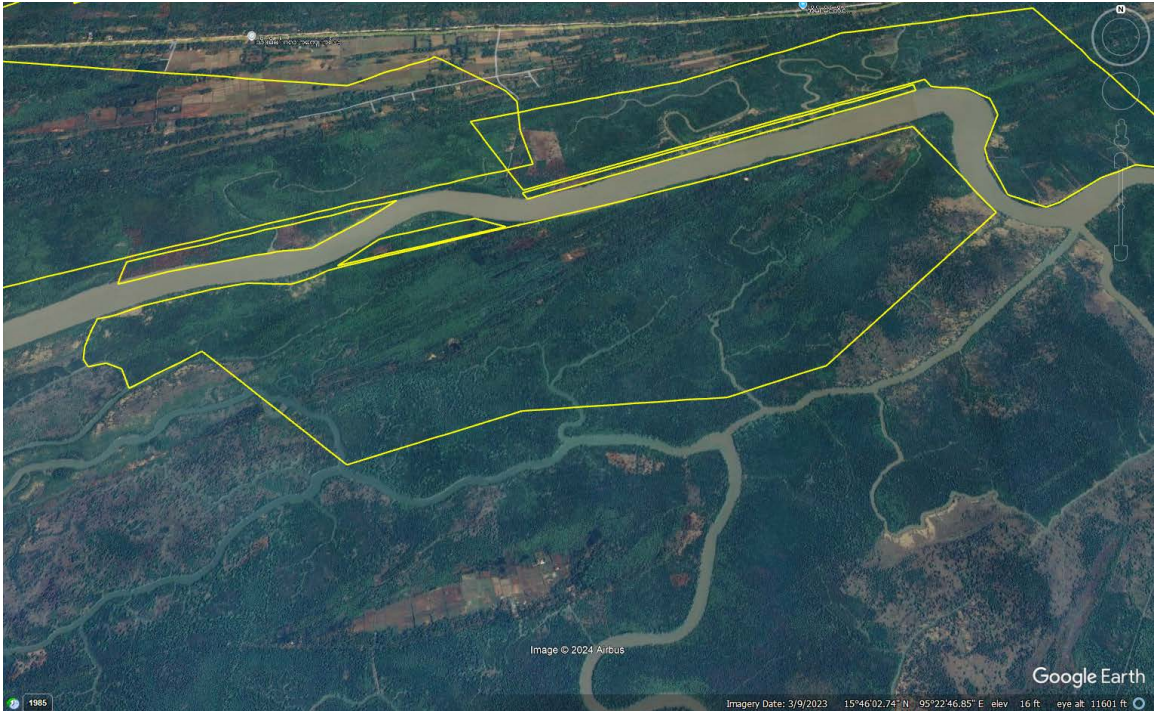
Padauk Pin Seik Community Forest (742) acre,

Pyindaye Reserved Forest Compartment 55,61,62(15°46'45"N 95°24'E)

ဖျာပုံမြို့နယ်၊ သစ်တောဦးစီးဌာန၊ ပြင်ဒရယ်ကြိုးဝိုင်း၊ အကွက်အမှတ် (၅၅၊ ၆၁၊ ၆၂) အတွင်း
ပိတောက်ပင်ဆိပ်ကျေးရွာ ဒေသခံပြည်သူအစုအဖွဲ့ပိုင်သစ်တော (၇၄၂) ဧက၏
ဧရိယာတိုင်းတာမှုပြမြေပုံ



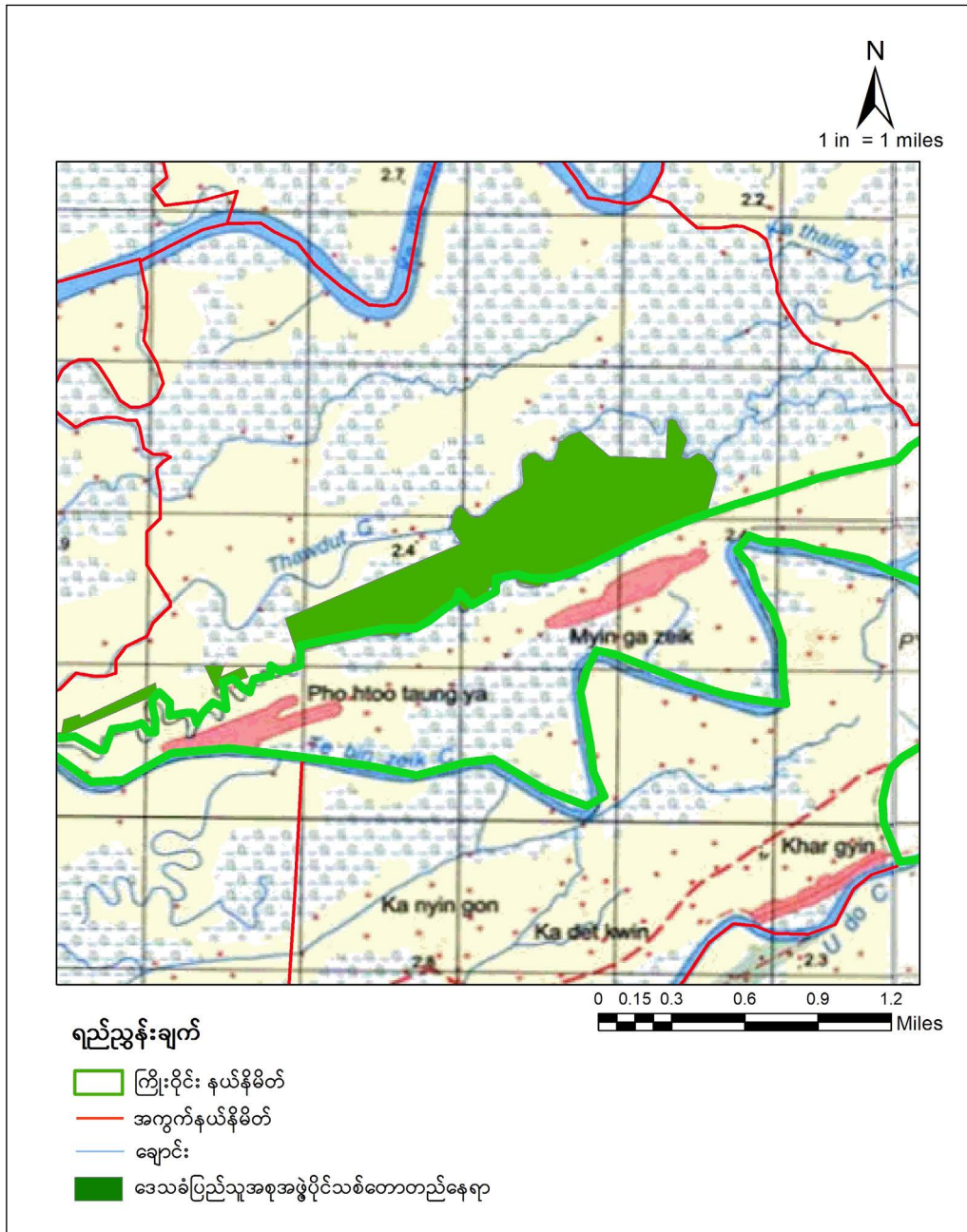
**Padauk Pin Seik Community Forest (742) acre,
Pyindaye Reserved Forest Compartment 55,61,62(15°46'45"N 95°24'E)**



Pho Htoo Taung Yar Community Forest(365.16) Acre,

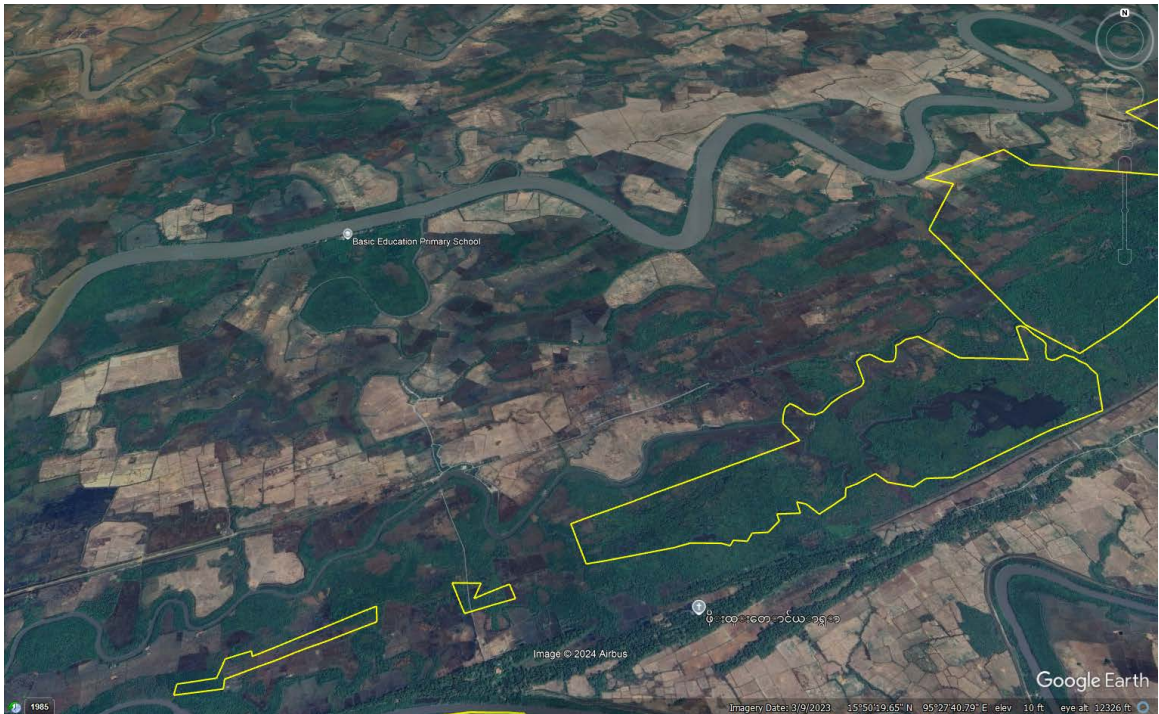
Pyindaye Reserved Forest, Compartment (47) 15°50'19.65"N 95°27'40.49"E

ဖျာပုံမြို့နယ်၊ သစ်တောဦးစီးဌာန၊ ပြင်ဒရယ်ကြိုးဝိုင်း၊ အကွက်အမှတ် (၄၇) အတွင်း
ဖိုးထူးတောင်ကျေးရွာ ဒေသခံပြည်သူ့အစုအဖွဲ့ပိုင်သစ်တော (၃၆၅.၁၆) ဧက၏
ဧရိယာတိုင်းတာမှုပြမြေပုံ



Pho Htoo Taung Yar Community Forest (365.16) Acre,

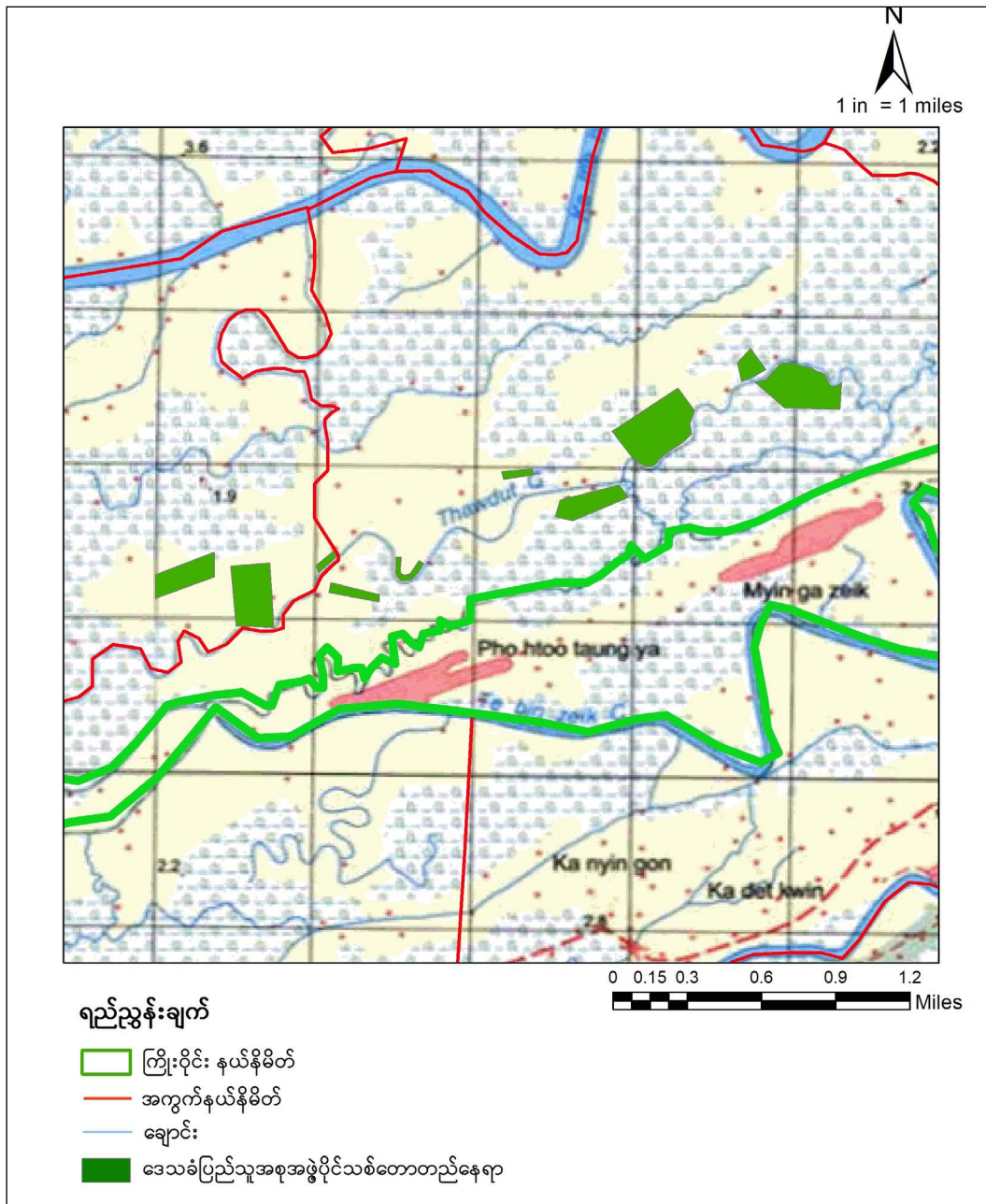
Pyindaye Reserved Forest, Compartment (47) 15°50'19.65"N 95°27'40.49"E



Taw Tuk Community Forest 134.38 Acre,

Pyindaye Reserved Forest, Compartment 46, 47 (15°49'46.33"N 95°27'28.69"E

ဖျာပုံမြို့နယ်၊ သစ်တောဦးစီးဌာန၊ ပြင်ဒရယ်ကြိုးဝိုင်း၊ အကွက်အမှတ် (၄၆၊ ၄၇) အတွင်း
တောတွတ်ကျေးရွာ ဒေသခံပြည်သူအစုအဖွဲ့ပိုင်သစ်တော (၁၃၄.၃၈) ဧက၏
ဧရိယာတိုင်းတာမှုပြမြေပုံ



Taw Tuk Community Forest 134.38 Acre,

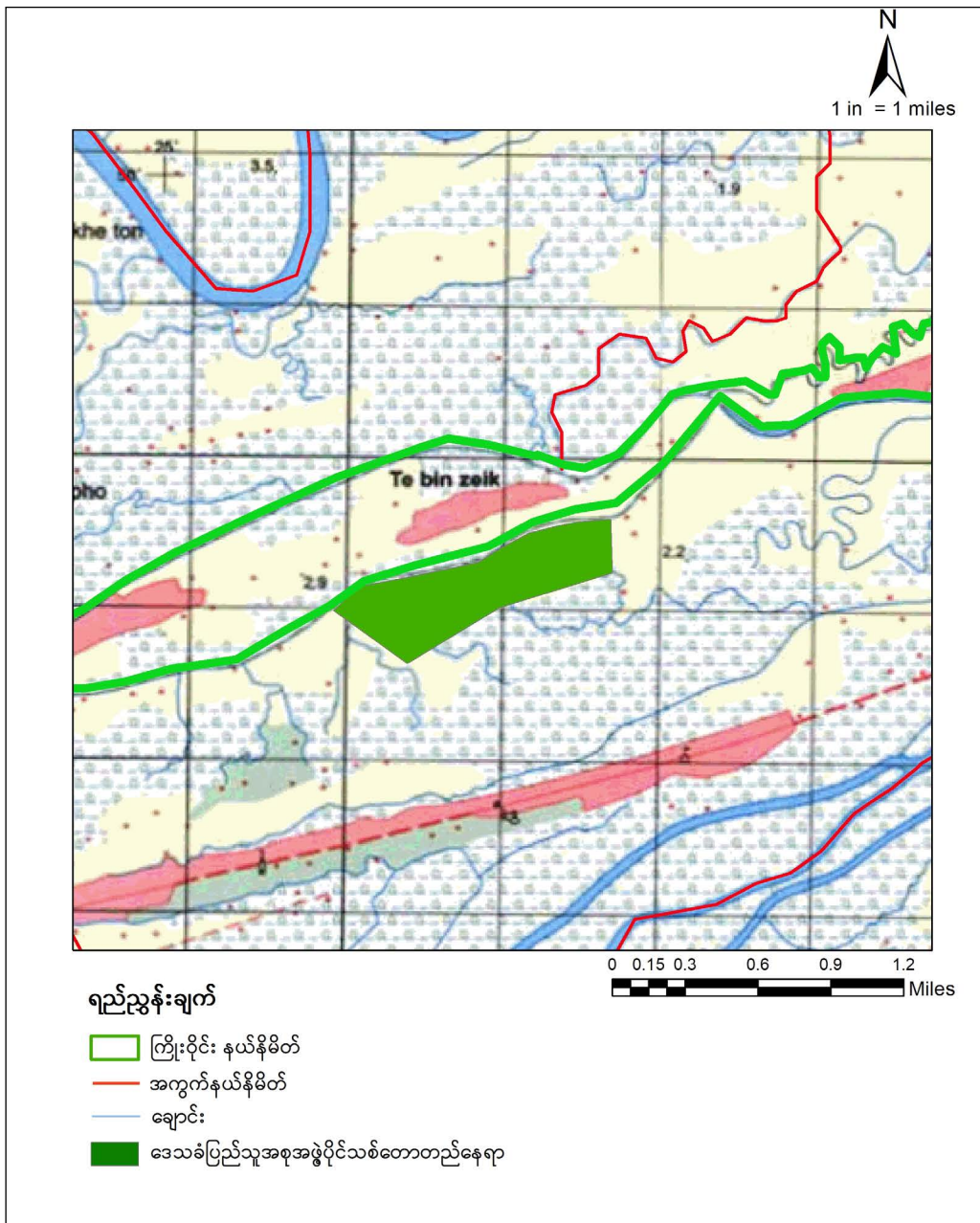
Pyindaye Reserved Forest, Compartment 46, 47 (15°49'46.33"N 95°27'28.69"E



Tebin Seik Community Forest (150) Acre,

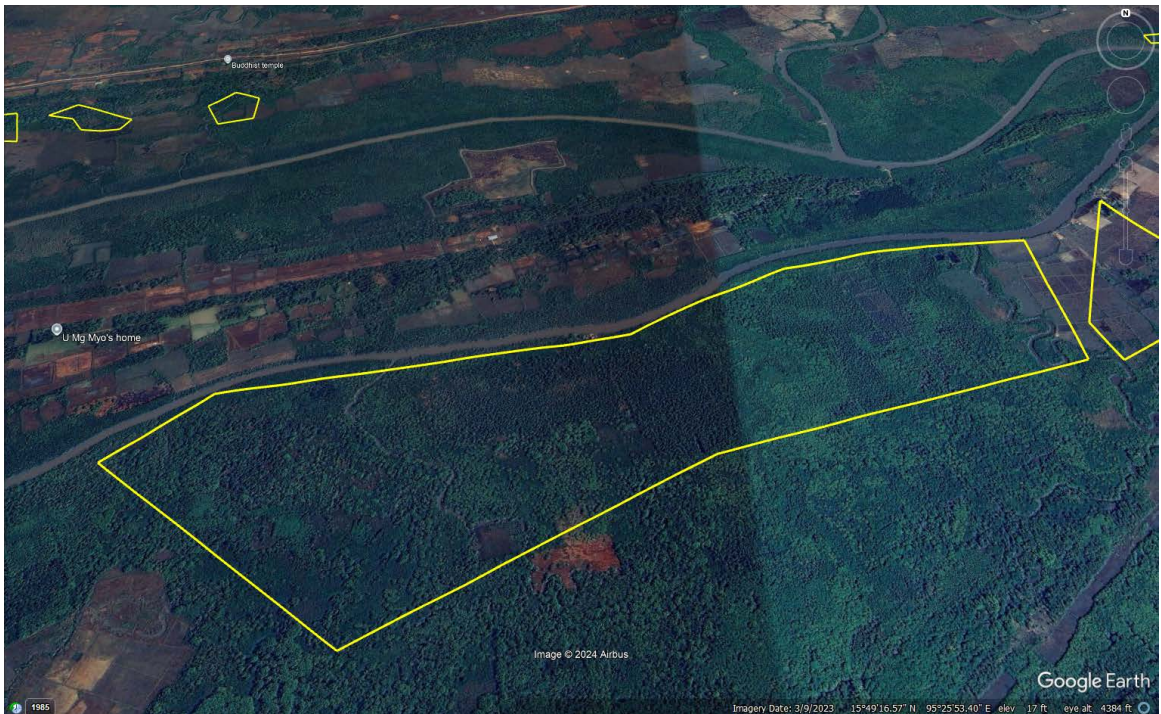
Pyindaye Reserved Forest, Compartment (56) 15°48'39.90"N 95°25'57.16"E

ဖျာပုံမြို့နယ်၊ သစ်တောဦးစီးဌာန၊ ပြင်ဒရယ်ကြိုးဝိုင်း၊ အကွက်အမှတ် (၅၆) အတွင်း
တယ်ပင်ဆိပ်ကျေးရွာ ဒေသခံပြည်သူအစုအဖွဲ့ပိုင်သစ်တော (၁၅၀) ဧက၏
ဧရိယာတိုင်းတာမှုပြမြေပုံ



Tebin Seik Community Forest (150) Acre,

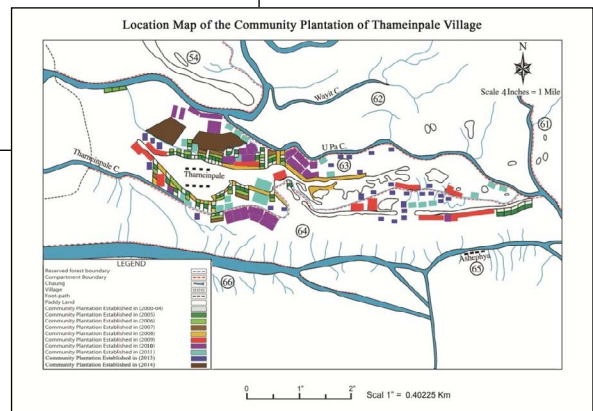
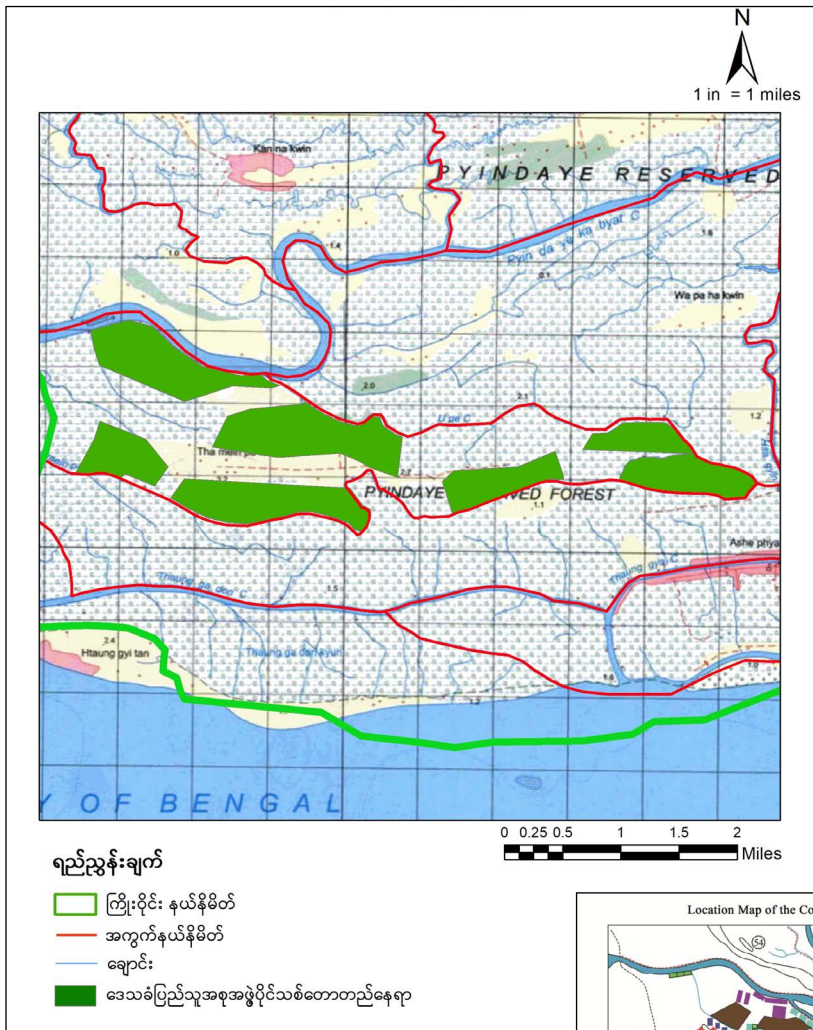
Pyindaye Reserved Forest, Compartment (56) $15^{\circ}48'39.90''\text{N}$ $95^{\circ}25'57.16''\text{E}$



Tha Main Pa Le Village Community Forest, (1321) acre,

Pyindaye reserved forest, compartment (63), 15°45'17.41"N95°17'57.16"E

ဖျာပုံမြို့နယ်၊ သစ်တောဦးစီးဌာန၊ ပြင်ဒရယ်ကြိုးဝိုင်း၊ အကွက်အမှတ် (၆၃) အတွင်း
သမိန်ပုလဲကျေးရွာ ဒေသခံပြည်သူ့အစုအဖွဲ့ပိုင်သစ်တော (၁၃၂၁) ဧက၏
ဧရိယာတိုင်းတာမှုပြမြေပုံ



Tha Main Pa Le Village Community Forest, (1321) acre,

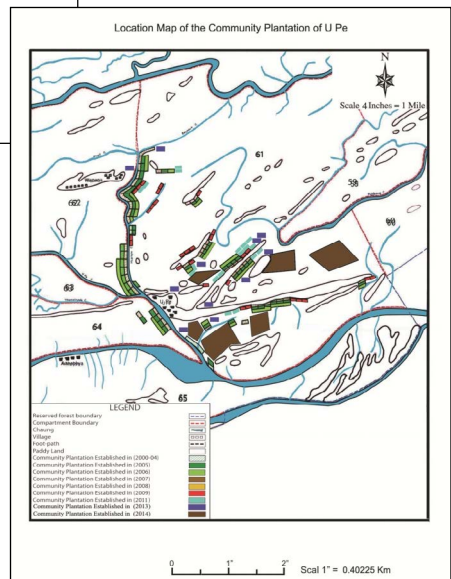
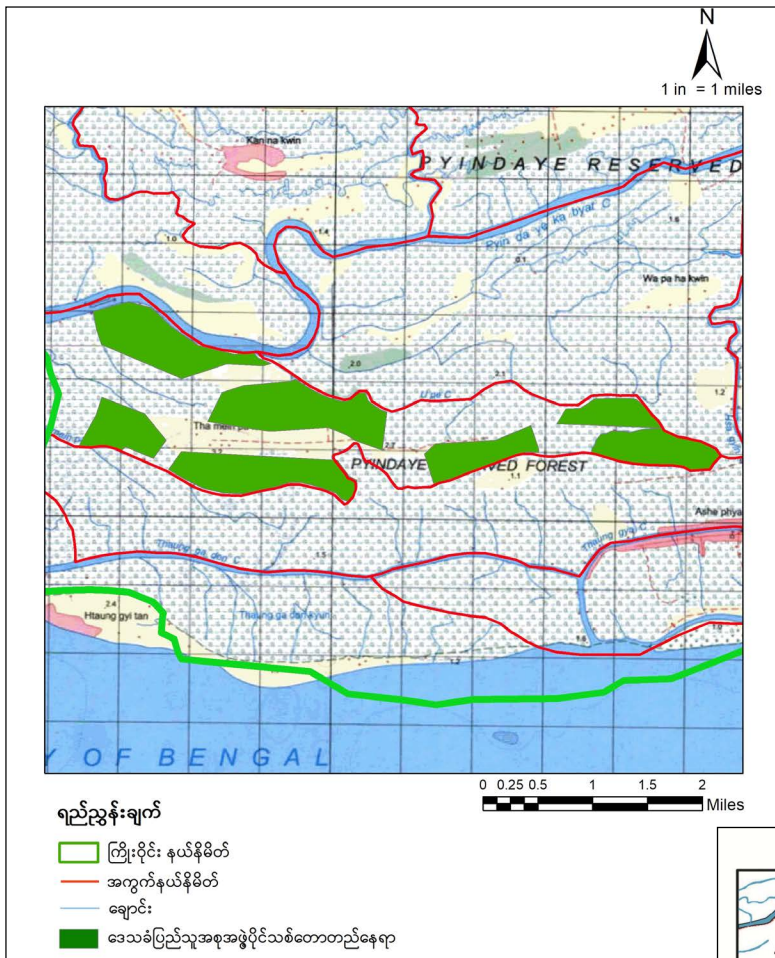
Pyindaye reserved forest, compartment (63), 15°45'17.41"N95°17'57.16"E



U Pay Village Community Forest, (810) Acre,

Pyindaye Reserved Forest, Compartment (61)(15°44'37.08"N 95°23'37.92"E

ဖျာပုံမြို့နယ်၊ သစ်တောဦးစီးဌာန၊ ပြင်ဒရယ်ကြိုးဝိုင်း၊ အကွက်အမှတ် (၆၁) အတွင်း
ဥပေကျေးရွာ ဒေသခံပြည်သူ့အစုအဖွဲ့ပိုင်သစ်တော (၈၁၀) ဧက၏
ဧရိယာတိုင်းတာမှုပြမြေပုံ



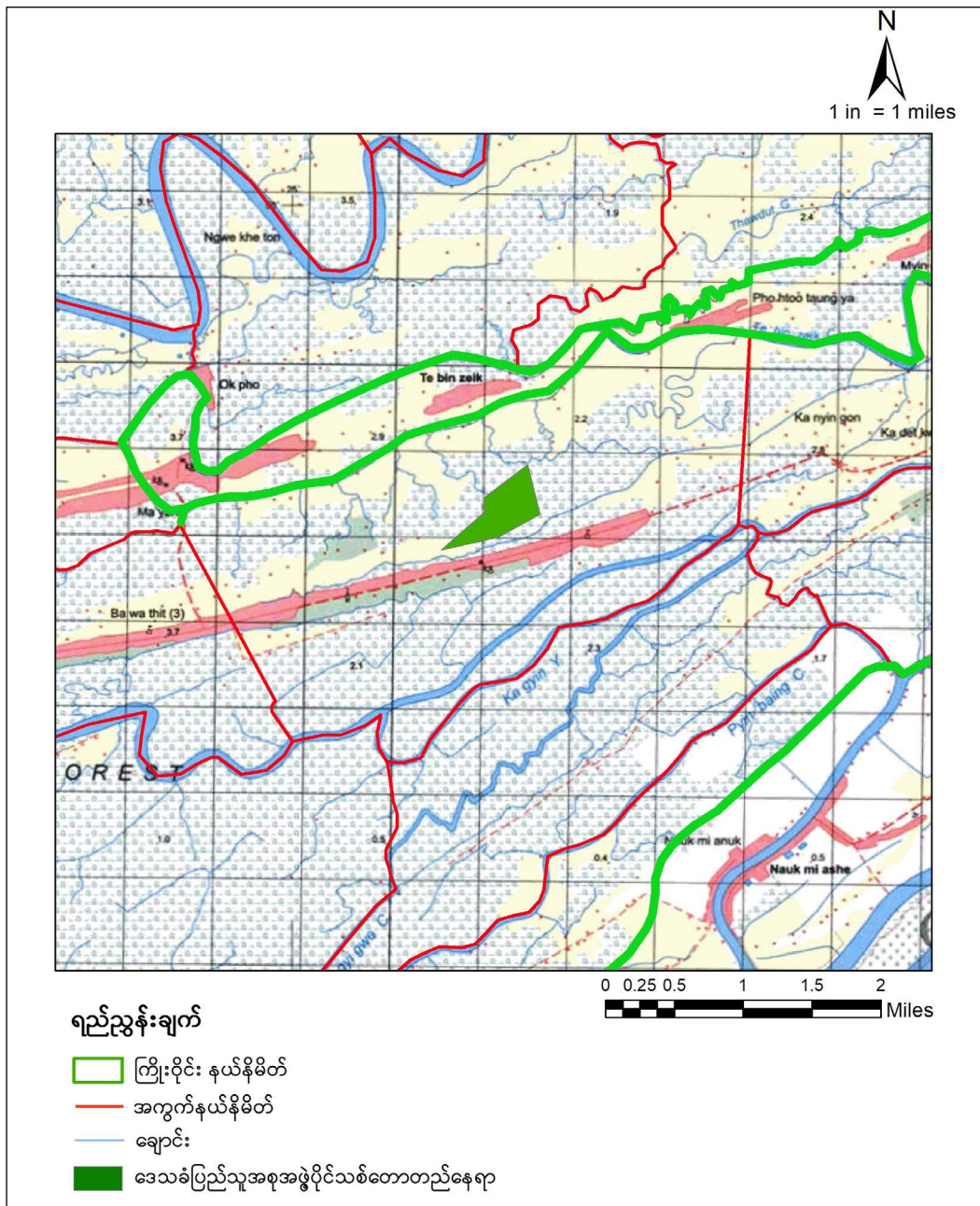
**U Pay Village Community Forest, (810) Acre,
Pyindaye Reserved Forest, Compartment (61)(15°44'37.08"N 95°23'37.92"E**



Wa Kone village community forests (100) acre,

Pyindaye Reserved Forest, Compartment (56)

ဖျာပုံမြို့နယ်၊ သစ်တောဦးစီးဌာန၊ ပြင်ဒရယ်ကြိုးဝိုင်း၊ အကွက်အမှတ် (၅၆) အတွင်း
ဝါးကုန်းကျေးရွာ ဒေသခံပြည်သူ့အစုအဖွဲ့ပိုင်သစ်တော (၁၀၀) ဧက၏
ဧရိယာတိုင်းတာမှုပြမြေပုံ



Wa Kone village community forests (100) acre,

Pyindaye Reserved Forest, Compartment (56)

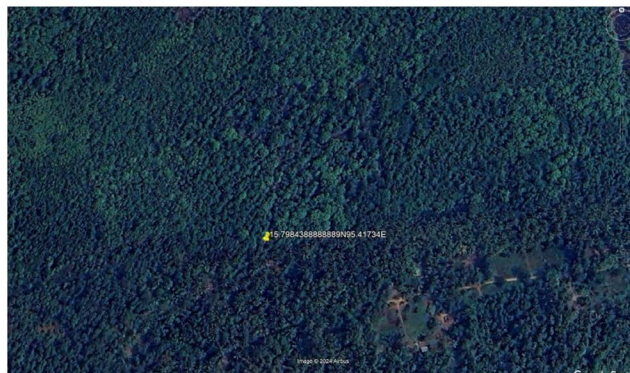


War Kone mangrove nursery(2018-2019) 15 48 1.8 15.8005 95 25 23.77 95.42327 15.8005N95.4237E

War Kone U Than's CF5 ac2018-19 15 48 0.81 15.80023 95 25 23.77 95.42327 15.800225N95.4227E



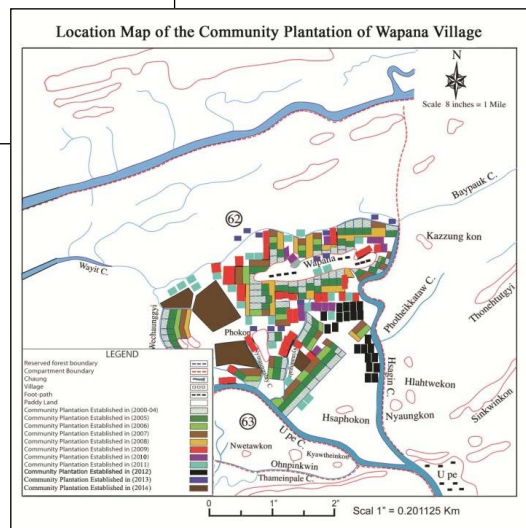
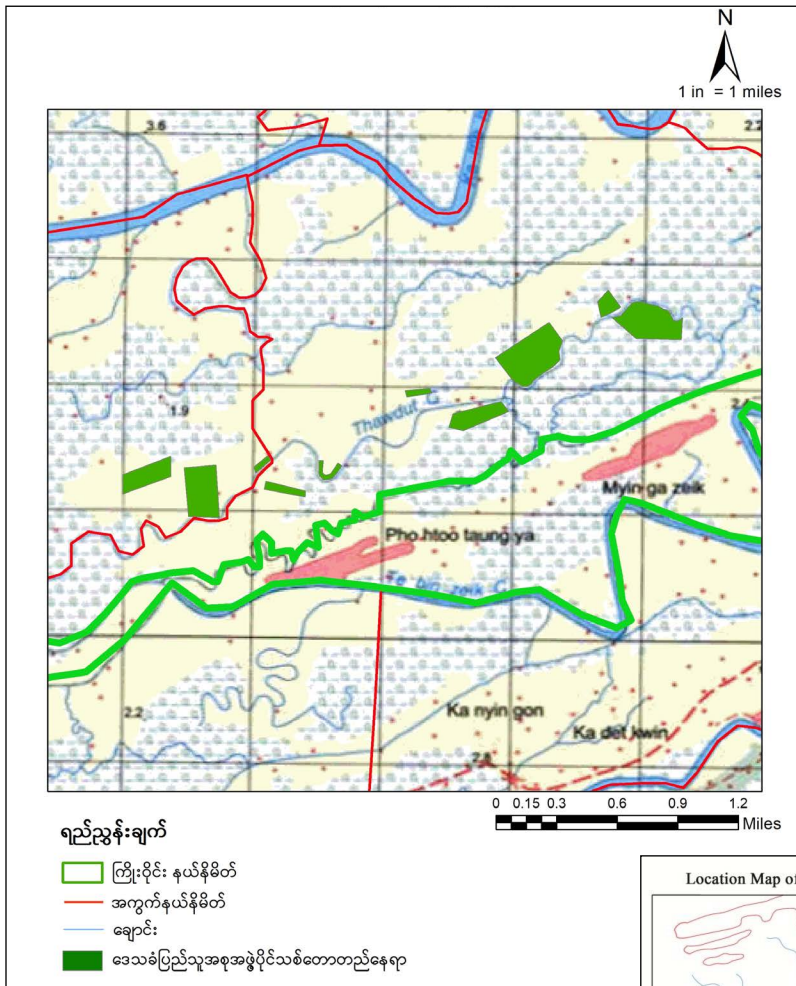
War Kone U Kyaw Soe CF (2000) 15 47 54.38 15.79844 95 25 2.43 95.41734
15.7984388888889 N95.41734E



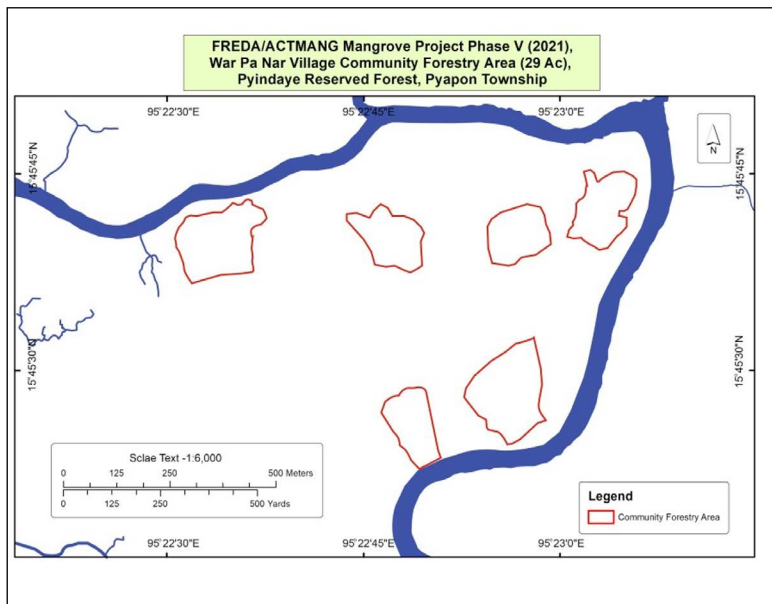
Wapana Village Community forest (1078) acre,

Pyindaye Reserved forest, compartment (62) 15°45'13"N 95°22'11"E

ဖျာပုံမြို့နယ်၊ သစ်တောဦးစီးဌာန၊ ပြင်ဒရယ်ကြိုးဝိုင်း၊ အကွက်အမှတ် (၆၂) အတွင်း
ဝါးပနားကျေးရွာ ဒေသခံပြည်သူ့အစုအဖွဲ့ပိုင်သစ်တော (၁၀၇၈) ဧက၏
ဧရိယာတိုင်းတာမှုပြမြေပုံ



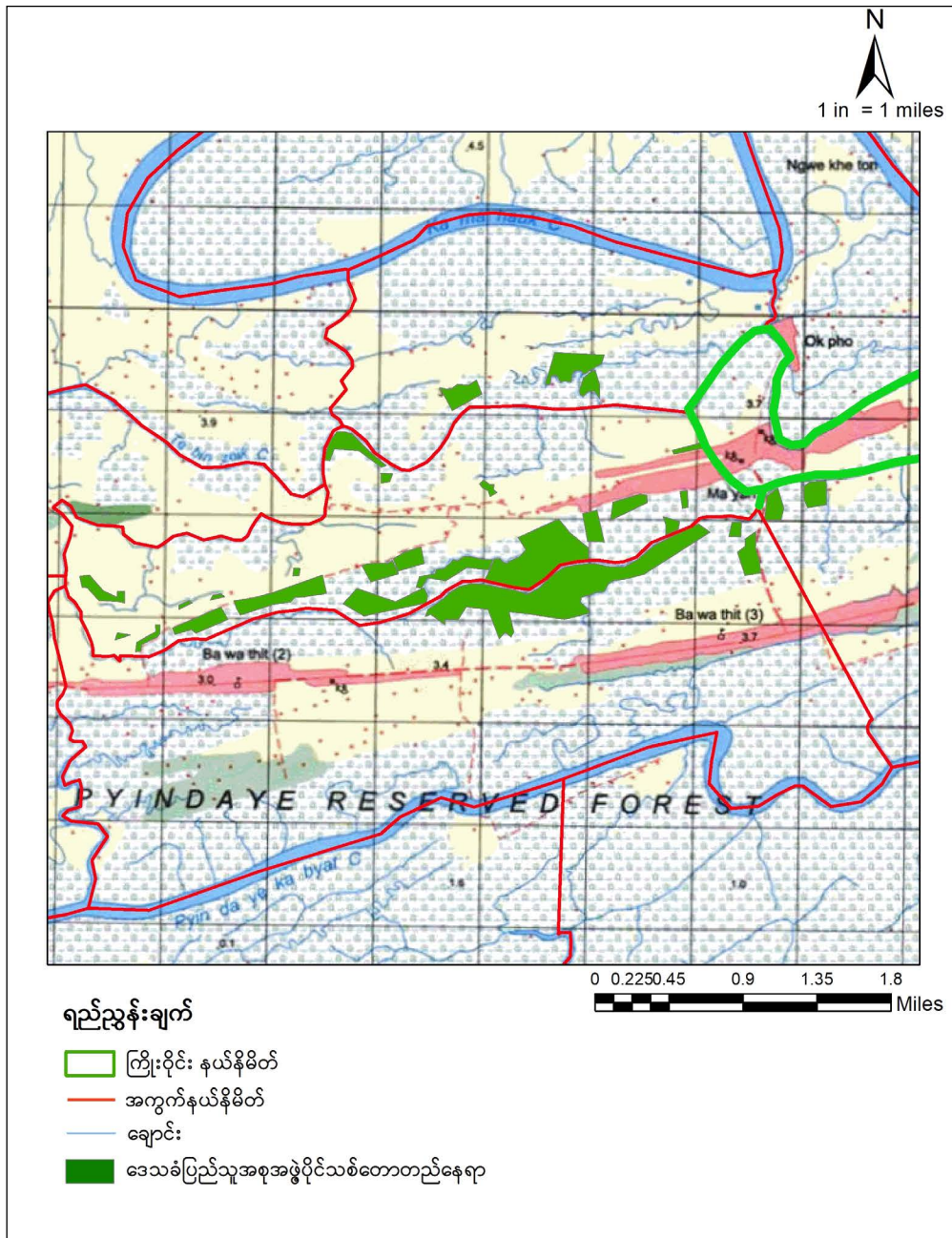
Wapana Village Community forest (1078) acre,
Pyindaye Reserved forest, compartment (62) 15°45'13"N95°22'11"E



West Ma Yan(A Nauk Ma Yan) village community forest(543)acre,

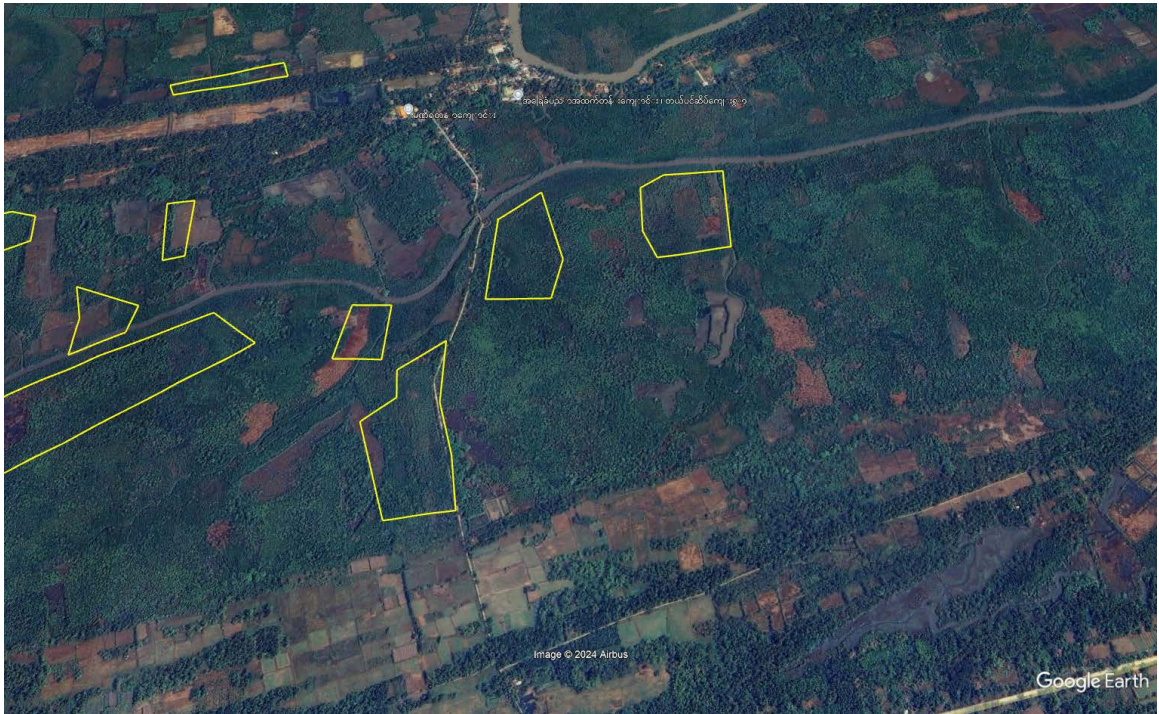
Pyindaye reserved forest compartment (49, 50,55, 56)

ဖျာပုံမြို့နယ်၊ သစ်တောဦးစီးဌာန၊ ပြင်ဒရယ်ကြိုးဝိုင်း၊ အကွက်အမှတ် (၄၉၊ ၅၀၊ ၅၅၊ ၅၆) အတွင်း
အနောက်မရမ်းကျေးရွာ ဒေသခံပြည်သူ့အစုအဖွဲ့ပိုင်သစ်တော (၅၄၃) ဧက၏
ဧရိယာတိုင်းတာမှုပြမြေပုံ



West Ma Yan(A Nauk Ma Yan) village community forest(543)acre,

Pyindaye reserved forest compartment (49, 50,55, 56)



Attachment 2.

Strategic Question used in evaluation of “Relevance, Effectiveness, Efficiency and Sustainability”

ဒီရေတောပြန်လည်ထူထောင်ရေးစီမံကိန်းအပေါ်အကဲဖြတ်ရန် မဟာဗျူဟာကျသောမေးခွန်းများ (Strategic Question)

- ၁။ ဖြေဆိုသူအမည် -----
- ၂။ ရာထူးနှင့်အဖွဲ့အစည်းအမည် -----
- ၃။ နေရပ်လိပ်စာ-----
- ၄။ ဆက်သွယ်ရန်ဖုန်းနံပါတ်/ အီးမေးလိပ်စာ -----
-

- ၅။ FREDa & ACTMANG မှဆောင်ရွက်ခဲ့သော ဒီရေတောပြန်လည်ထူထောင်ရေးစီမံကိန်း Phase I to Phase V ၌ ဒေသခံပြည်သူအစုအဖွဲ့ပိုင်သစ်တောများတွင် ဒီရေတော ပြန်လည်စိုက်ပျိုးတည်ထောင်ရေးလုပ်ငန်းများ၌ ပါဝင်လုပ်ကိုင် ဆောင်ရွက်ဖူးပါသလား?

Yes or No

(သို့မဟုတ်)ပြည်တွင်းပြည်ပအဖွဲ့အစည်းများကိုယ်စား ညှိနှိုင်းပေါင်းစပ်ဆောင်ရွက်သူ/ဟောပြောပို့ချသူ/အတိုင်ပင်ခံ/အစိုးရဌာနအဖွဲ့အစည်း တစ်ခုခု၏ ဝန်ထမ်းအဖြစ် ဒီရေတောပြန်လည်ထူထောင်ရေးစီမံကိန်း Phase I to Phase V မှ တည်ထောင်စိုက်ပျိုးခဲ့သည့် ပြင်ဒရာယ်ကြိုးဝိုင်းအတွင်းရှိ ဒေသခံပြည်သူအစုအဖွဲ့ပိုင်သစ်တောများသို့ ရောက်ရှိခဲ့ဘူးပါသလား?

Yes or No

ဒေသခံပြည်သူအစုအဖွဲ့ပိုင်သစ်တောများတွင် ဒီရေတောပြန်လည်စိုက်ပျိုးတည်ထောင်ရေး လုပ်ငန်းများ၌ ပါဝင်လုပ်ကိုင်ဆောင်ရွက်ဖူးလျှင်

ပါဝင် လုပ်ကိုင် ဆောင်ရွက်ခဲ့သည့်ခုနှစ်/ ကာလ

ရောက်ရှိခဲ့ဖူးသည့်ခုနှစ် -----

ပါဝင်လုပ်ကိုင်ဆောင်ရွက်ခဲ့သည့် Phase -----

ပါဝင်လုပ်ကိုင်ဆောင်ရွက်ခဲ့သည့် ဒေသခံပြည်သူအစုအဖွဲ့ပိုင်သစ်တောအမည်

- ၆။ ဒေသခံပြည်သူအစုအဖွဲ့ပိုင်သစ်တောတွင် ပါဝင်ဆောင်ရွက်နေမှု
- (က) အသုံးပြုသူများအဖွဲ့ CFUG အဖွဲ့ဝင်
 - (ခ) စီမံခန့်ခွဲမှုကော်မတီ ဥက္ကဋ္ဌ/ အတွင်းရေးမှူး/ဘဏ္ဍာရေးမှူး/ အဖွဲ့ဝင်
 - (ဂ) ပြည်တွင်းပြည်ပအဖွဲ့အစည်း(eg FREDA, RECOFT, GEDA, ACP, MERN,
 - (ဃ) ညှိနှိုင်းပေါင်းစပ်ဆောင်ရွက်နေသူ
 - (င) သုတေသနဆောင်ရွက်သူ
 - (စ) ဟောပြောပို့ချသူ/ အတိုင်ပင်ခံ
 - (ဆ) ဝန်ထမ်း
 - (ဇ) အခြား
- ၈။ ဖြေဆိုသည့်ရက်စွဲ
- ၉။ ဖြေဆိုသည့်နေရာ
- ၁၀။ FREDA & ACTMANG မှဆောင်ရွက်ခဲ့သော ဒီရေတောပြန်လည်ထူထောင်ရေး စီမံကိန်းနှင့်ပတ်သက်၍ သင်၏အမြင်ကိုပွင့်လင်းလင်းပြောကြားပေးနိုင်ပါသလား?။

Yes or No

ဒီရေတော ပြန်လည်ထူထောင်ရေးစီမံကိန်းအပေါ် အကဲဖြတ်ရန် မဟာဗျူဟာကျသော မေးခွန်းများ (Strategic Question)ကို သင့်စိတ်ထဲရှိသည့်အတိုင်း ဖြေကြားပေးနိုင်ပါသလား?

Yes or No

ဒီရေတောပြန်လည်ထူထောင်ရေး စီမံကိန်းဆောင်ရွက်ရခြင်းနှင့် ဒီရေတောထိန်းသိမ်းရေး၊ သဘာဝပတ်ဝန်းကျင်ထိန်းသိမ်းရေး၊ ဒီရေတောဂေဟစနစ် ထိန်းသိမ်းရေး၊ ဇီဝမျိုးစုံမျိုးကွဲထိန်းသိမ်းရေး၊ လူမှုစီးပွားဘဝ ဖွံ့ဖြိုးတိုးတက်ရေး အဆက်အစပ် Relevancy ရှိမှု ဆန်းစစ်ခြင်း။

ဒီရေတောပြန်လည်ထူထောင်ရေး စီမံကိန်းနှင့်ဒေသခံပြည်သူအစုအဖွဲ့ပိုင် သစ်တောလုပ်ငန်းအုပ်ချုပ်လုပ်ကိုင်မှုစီမံချက် ရေးဆွဲအကောင်အထည်ဖော်ခြင်း။

- ၁။ စီမံကိန်း၏ရည်မှန်းချက်များ၊ ဒီရေတောပြန်လည်ထူထောင်ရေးလုပ်ငန်းများသည် ဒေသ၏ သဘာဝပတ်ဝန်းကျင်၊ လူမှုရေး၊ စီးပွားရေး၊ ဒီရေတောဂေဟစနစ် လိုအပ်ချက်များနှင့်ကိုက်ညီမှု ရှိ-မရှိ။ ကောင်းကျိုး/ဆိုးကျိုး Impact များရှိ-မရှိ ဆန်းစစ်ခြင်း။
(ကိုက်ညီပါက ၁ မှတ်၊ မကိုက်ညီပါက ၀ မှတ်)

စဉ်	အဆက်အစပ် Relevancy	ရမှတ်
	(က) သဘာဝပတ်ဝန်းကျင်။ ဒီရေတောပြန်လည်ထူထောင်ရေးစီမံကိန်း ဆောင်ရွက်ခြင်းအားဖြင့် သဘာဝပတ်ဝန်းကျင် (Environment) လိုအပ်ချက်များကို ဖြည့်ဆည်းပေးနိုင်ခြင်း/ဒီရေတော ပြန်လည်ထူထောင်ရေးစီမံကိန်း ဆောင်ရွက်ခြင်းအားဖြင့် သဘာဝပတ်ဝန်းကျင်ထိခိုက်ပျက်စီးမှုလျော့နည်းသွားခြင်း။	
၁။	၂၅ နှစ်တာကာလအတွင်း သင်နေထိုင်ရာအရပ်/ကျေးရွာအနီး သဘာဝပတ်ဝန်းကျင်တွင် ဒီရေတောများ တိုးပွားလာလျှင် (၁)မှတ်။ ဒီရေတောများ လျော့နည်းပျက်စီးသွားလျှင် ၀ မှတ်။	
၂။	မြေဆီလွှာရေတိုက်စားမှုကိုလျော့ချနိုင်လျှင် ၁ မှတ်။ မြေဆီလွှာ ရေတိုက်စားလျှင် ၀ မှတ်။	
၃။	မြစ်ချောင်း ကမ်းပါးနှင့်ပင်လယ် ကမ်းစပ်တစ်လျှောက် ဒီရေတောပင်များ စိုက်ပျိုးထား၍ သင်၏ကျေးရွာ/လယ်ယာမြေအနီး မြစ်ချောင်းကမ်းပါးပြိုမှု၊ ပင်လယ်ကမ်းခြေ ရေတိုက်စားမှုကို တားဆီးပေးလျက်ရှိပါသလား? စက်လှေ၊ မော်တော်များ မောင်းနှင်သွားလာစဉ် ရေလှိုင်းပုတ်ခပ်ပါက ကမ်းပါးပြိုမှုကို တားဆီးပေးလျက်ရှိပါသလား? (၁)မှတ် မြစ်ချောင်းကမ်းပါးပြိုမှု၊ ပင်လယ်ကမ်းခြေရေတိုက်စားမှုကို တားဆီးမပေးနိုင်လျှင်(၀)မှတ်။	
၄။	သင်၏ကျေးရွာကို ဆူနာမီကဲ့သို့သော ဒီရေလှိုင်းပုတ်ခတ်ခြင်း၏ဆိုးကျိုးများမှ ဒီရေတောများက လျော့ချနိုင်လျှင် ၁ မှတ်။ ဆူနာမီကဲ့သို့သော ဒီရေလှိုင်းပုတ်ခတ်ခြင်း၏ ဆိုးကျိုးများခံရလျှင် (၀) မှတ်။	
၅။	ဒီရေတောများရှိခြင်းကြောင့် လေပြင်းမုန်တိုင်းတိုက်ခတ်လာပါက သင်၏ကျေးရွာ၌ ပျက်စီးဆုံးရှုံးမှုလျော့ချနိုင်လျှင် ၁ မှတ်။ လေပြင်းမုန်တိုင်းတိုက်ခတ်လာပါက ပျက်စီးဆုံးရှုံးမှုရှိလျှင်(သို့)မလျော့ချနိုင်လျှင် (၀) မှတ်။	
၆။	လယ်ယာနှင့် သင်၏ကျေးရွာ သောက်သုံးရေကန်ထဲသို့ ဆားငန်ရေများဝင်ရောက်မှုကို ဒေသခံပြည်သူအစုအဖွဲ့ပိုင် ဒီရေတောများက တားဆီးပေးနိုင်လျှင် (၁)မှတ်။ လယ်ယာနှင့်သောက်သုံးရေကန်ထဲသို့ ဆားငန်ရေများဝင်ရောက်မှုကို တားဆီးမပေးနိုင်လျှင် (၀)မှတ်။	
၇။	ဒေသခံပြည်သူအစုအဖွဲ့ပိုင် ဒီရေတောများရှိခြင်းကြောင့် လေညစ်ညမ်းမှုလျော့ချခြင်း၊ လေကောင်းလေသန့်ရရှိခြင်း။	
	(ခ) လူမှုရေး။ ဒီရေတောပြန်လည်ထူထောင်ရေး စီမံကိန်းလုပ်ငန်းများဆောင်ရွက်ခြင်းဖြင့် အောက်ပါ လူမှုရေးလိုအပ်ချက်များနှင့် ကိုက်ညီမှုရှိပါသလား။	
၈။	ဒေသခံပြည်သူတို့၏ အလုပ်အကိုင်အခွင့်အလမ်းများတိုးလာခြင်း။	
၉။	စီမံကိန်းလုပ်ငန်းများဆောင်ရွက်ခြင်းဖြင့် ဝင်ငွေများရခြင်း။	

စဉ်	အဆက်အစပ် Relevancy	ရမှတ်
၁၀။	ပညာရေး၊ ကျန်းမာရေး၊ လူမှုရေးလိုအပ်ချက်များကို ဖြည့်ဆည်းပေးနိုင်ခြင်း။	
	(ဂ) စီးပွားရေး။ ဒီရေတောပြန်လည်ထူထောင်ရေး စီမံကိန်းလုပ်ငန်းများဆောင်ရွက်ခြင်းဖြင့် အောက်ပါ စီးပွားရေးလိုအပ်ချက်များနှင့် ကိုက်ညီမှုရှိပါသလား။	
၁၁။	ဒီရေတောပြန်လည်ဖုန်းလွှမ်းလာသဖြင့် ငါး၊ ပုစွန်၊ ဂဏန်း၊ သွေးဂုံး စသည့် ရေထွက်ပစ္စည်းများ ပြန်လည်ပေါများလာကာ ဒေသခံပြည်သူတို့၏ စီးပွားရေး ဖွံ့ဖြိုးတိုးတက်လာခြင်း။	
၁၂။	ဒီရေတောမှ သစ်နှင့်သစ်တောထွက်ပစ္စည်းများ ခုတ်လှဲရောင်းချခြင်းဖြင့် ဝင်ငွေများ ရလာပြီး စီးပွားရေးဖွံ့ဖြိုးတိုးတက်လာခြင်း။	
၁၃။	ဒေသခံပြည်သူအစုအဖွဲ့ပိုင် သစ်တောစိုက်ခင်းအား လွှဲပြောင်းရောင်းချခြင်း မပြုရန် လိုက်နာဆောင်ရွက်နေပါသလား။	
၁၄။	ဒေသခံပြည်သူအစုအဖွဲ့ပိုင် သစ်တောစိုက်ခင်းမှ ထမင်းဟင်းချက်ပြုတ်ရန်၊ ပုစွန်ခြောက်ပြုလုပ်ရန်၊ အိမ်ခြံစည်းရိုးကာရန်၊ ရေလုပ်ငန်းသုံးရန် ထင်းတိုင်မျော ထုတ်ယူခြင်းဖြင့် ဝင်ငွေများရခြင်းရှိပါသလား။ သို့မဟုတ် ပိုက်ဆံပေးဝယ်ယူစရာ မလိုအပ်သဖြင့် ထွက်ငွေလျော့ချနိုင်ပါသလား။	

၂။ ဒီရေတောပြန်လည်စိုက်ပျိုးခြင်းဖြင့် ဒီရေတောဂေဟစနစ် (Ecosystem)နှင့် ဒေသခံပြည်သူများ၏ စိုးရိမ်မှုများကို ကိုင်တွယ်ဖြေရှင်းခြင်းရှိပါသလား။

စဉ်	အဆက်အစပ် Relevancy	ရမှတ်
	(က) အောက်ပါ ဒီရေတော ဂေဟစနစ်၏ ဝန်ဆောင်မှုများကို ဖြည့်ဆည်းပေးနိုင်ပါသလား?	
၁၅။	သင်၏ ဒေသခံပြည်သူအစုအဖွဲ့ပိုင် ဒီရေတောဂေဟစနစ်သည် ကမ်းရိုးတန်းတိုက်စားမှု၊ မုန်တိုင်းဒီရေလှိုင်းများနှင့် ဆူနာမီများကိုတိုက်ဖျက်ရန် သဘာဝ အတားအဆီးများအဖြစ် ဆောင်ရွက်ပေးနေပါသလား။	
၁၆။	ကမ်းရိုးတန်းဒေသများနှင့် ရာသီဥတုပြင်းထန်သောဖြစ်ရပ်များ၏ အကျိုးသက်ရောက်မှုများမှ အကာအကွယ်ပေးနိုင်ပါသလား။	
၁၇။	ဒီရေတောဂေဟစနစ်သည် အပင်နှင့်တိရစ္ဆာန်မျိုးစိတ်များ ငါး၊ ငှက်များနှင့် နို့တိုက်သတ္တဝါများအပါအဝင် မျိုးစိတ်အမျိုးမျိုးအတွက် မရှိမဖြစ်လိုအပ်သော နေရင်းဒေသများကို ဖွံ့ဖြိုးပေးနေပါသလား?	
၁၈။	ဇီဝမျိုးစုံမျိုးကွဲများကို ထိန်းသိမ်းစောင့်ရှောက်ပေးနေပါသလား။	
၁၉။	ဒီရေတောတွင်ပေါက်ရောက်သည့် သစ်မျိုးများ၏ ဇီဝမျိုးစုံမျိုးကွဲပေါကြွယ်ဝမှု များစေရန် ရှားပါးသစ်မျိုးများ/ မျိုးသုဉ်းပျောက်ကွယ်နိုင်သည့် သစ်မျိုးများ၊ ခုတ်လှဲထုတ်ယူမှုများသည့် သစ်မျိုးများကို စိုက်ပျိုးထိန်းသိမ်းခြင်း ပြုလုပ်ပါသလား။	

စဉ်	အဆက်အစပ် Relevancy	ရမှတ်
၂၀။	ဒီရေတောတွင်မှီတင်းနေထိုင်ကြသည့် ရှားပါးတောရိုင်းတိရစ္ဆာန်များ ဇီဝမျိုးစုံမျိုးကွဲပေါကြွယ်ဝမှု တိုးပွားများပြားလာစေရန်၊ တောရိုင်းတိရစ္ဆာန်များကို မျိုးသုဉ်းပျောက်ကွယ်မသွားစေရန် အမဲလိုက်ခြင်း၊ ကင်းလှည့်ထိန်းသိမ်းခြင်း မွေးမြူခြင်းလုပ်ငန်းများ ဆောင်ရွက်ပါသလား။	
၂၁။	ဒီရေတောဂေဟစနစ်များ ပြန်လည်ထူထောင်ခြင်းသည် ကာဗွန်စုပ်ယူနိုင်စွမ်းကို တိုးမြှင့်စေနိုင်ပါသလား?	
၂၂။	လေထုအတွင်း ဖန်လုံအိမ်ဓာတ်ငွေ့ပါဝင်မှုကို လျှော့ချပေးနိုင်ပါသလား?	
၂၃။	ရာသီဥတုပြောင်းလဲမှုကို လျော့ချစေနိုင်ပါသလား။	
၂၄။	လယ်ယာများတွင် ဓာတ်မြေဩဇာများကို အလွန်အကျွံမသုံးစွဲရန် အသိပညာပေးဆောင်ရွက်နေပါသလား။	
၂၅။	ဒီရေတော ပြန်လည်တည်ထောင်စိုက်ပျိုးခြင်း စီမံကိန်းဆောင်ရွက်ခြင်းဖြင့် လယ်ယာများတွင်သုံးသော ပိုလျှံသည့်ဓာတ်မြေဩဇာများကို ဒီရေတောများ၊ မြစ်ချောင်းကမ်းပါးကြားခံနံရံသစ်ပင်သစ်တောများက ထိန်းသိမ်းပေးနိုင်ခြင်း၊ ရေညှိပြင်များတိုးပွားမှု Algae Bloom ကို ထိန်းချုပ်ပေးနိုင်ခြင်း၊ ပင်လယ်ရေတွင် အောက်ဆီဂျင်ပါဝင်မှု တိုးမြှင့်ပေးနိုင်ခြင်း၊ ရေနေသတ္တဝါများ သေဆုံးစေနိုင်သည့် Dead Zone ဖြစ်ပေါ်မှုကို တားဆီးပေးနိုင်ခြင်းစသည့် အကျိုးကျေးဇူးများ ရစေနိုင်ပါသလား။	
၂၆။	ဒီရေတောဂေဟစနစ်များသည် စီးပွားဖြစ် အဖိုးတန်ငါး ပုစွန်၊ ဂဏန်း၊ ဂုံး များနှင့် ခရုမျိုးစိတ်များ ပေါများလာစေနိုင်ပါသလား။	
၂၇။	ရေရှည်တည်တံ့သော ရေထွက်ပစ္စည်းလုပ်ငန်းကို ပံ့ပိုးပေးကာ ငါး၊ ပုစွန်၊ ဂဏန်း၊ ဂုံး စသည့် ရေသယံဇာတအရင်းအမြစ်များကို မှီခိုနေရသော ဒေသခံလူထုကို အကျိုးပြုစေနိုင်ပါသလား။	
၂၈။	ဒီရေတော ဂေဟစနစ်များ ပြန်လည်ထူထောင်ခြင်းသည် ကျန်းမာသော ကမ်းရိုးတန်းဂေဟစနစ်များ ပြန်လည်ထူထောင်ခြင်းနှင့် ထိန်းသိမ်းခြင်းတို့ကို အထောက်အကူဖြစ်စေပါသလား။	
၂၉။	ဒီရေတောဂေဟစနစ်များသည် ငါးဖမ်းခြင်း၊ ခရီးသွားလုပ်ငန်းနှင့် သစ် မဟုတ်သော သစ်တောထွက်ပစ္စည်းများ အပါအဝင် ကမ်းရိုးတန်းလူထုအတွက် အသက်မွေးဝမ်းကျောင်းဆိုင်ရာ အခွင့်အလမ်းများစွာကို ပေးနေပါသလား။	
၃၀။	ဒီရေတောဂေဟစနစ်များသည် ပင်လယ်ရေမျက်နှာပြင် မြင့်တက်ခြင်း၊ မုန်တိုင်းကြိမ်နှုန်းတိုးလာခြင်းနှင့် ကမ်းရိုးတန်း ရေလွှမ်းမိုးခြင်းကဲ့သို့သော ရာသီဥတုပြောင်းလဲမှုဆိုင်ရာ အကျိုးသက်ရောက်မှုများအပေါ် ကမ်းရိုးတန်းလူ့အဖွဲ့အစည်းများ၏ ခံနိုင်ရည်အား မြှင့်တင်ပေးနေပါသလား။	
၃၁။	ဒီရေတောများ ပြန်လည်ထူထောင်ခြင်းဖြင့် ရာသီဥတုပြောင်းလဲမှုနှင့် လိုက်လျောညီထွေရှိသော ဒေသခံပြည်သူများ၏စွမ်းရည်ကို မြှင့်တင်နိုင်ပြီး ရာသီဥတုနှင့်ဆက်စပ်သော အန္တရာယ်များကို လျှော့ချနိုင်ပါသလား။	

စဉ်	အဆက်အစပ် Relevancy	ရမှတ်
၃၂။	ဒီရေတောများပြန်လည်စိုက်ပျိုးခြင်းသည် ဒီရေတောများမှ ပေးဆောင်သော အဖိုးတန်ဂေဟစနစ်ဝန်ဆောင်မှုများ တည်တံ့စေရန်နှင့် ကမ်းရိုးတန်းဒေသခံများနှင့် ဂေဟစနစ်များ၏ ရေရှည်တည်တံ့မှုကို အာမခံချက်ပေးနိုင်ပါလား။	
၃၃။	ဒေသခံပြည်သူများ၏ စိုးရိမ်မှုများကို ဒီရေတောပြန်လည် စိုက်ပျိုးခြင်းဖြင့် ကိုင်တွယ်ဖြေရှင်းခြင်း ရှိပါသလား။	

၃။ ဒီရေတောပြန်လည်ထူထောင်ရေး စီမံကိန်းနှင့် ဒေသခံပြည်သူအစုအဖွဲ့ပိုင် သစ်တောလုပ်ငန်းအုပ်ချုပ်လုပ်ကိုင်မှုစီမံချက်များကို အကောင်အထည်ဖော်ရန် နေရာပြင်ဆင်ခြင်းနှင့် ဒီရေတောများ စိုက်ပျိုးခြင်း။

ကျင့်သုံးသည့် စိုက်ပျိုးနည်းစနစ်များနှင့် မျိုးစိတ်ရွေးချယ်မှုသည် ဒေသပတ်ဝန်းကျင်နှင့် ဂေဟစနစ်လိုအပ်ချက်များအတွက် သင့်လျော်မှုရှိခြင်း။

စဉ်	အဆက်အစပ် Relevancy	ရမှတ်
	(က) အောက်ပါ ဒီရေတော စိုက်ပျိုးနည်းစနစ်များသည် ဒေသပတ်ဝန်းကျင်နှင့် ဂေဟစနစ်လိုအပ်ချက်များအတွက် သင့်လျော်မှုရှိပါသလား။	
၃၄။	ပျိုးဥယျာဉ်တွင် ၇"x ၃" အရွယ် ပျိုးအိပ်ဖြင့်(၇လ မှ ၈ လကြာ) ကြိုတင်ပျိုးထောင်၍ မိုးဦးကျတွင် စိုက်ခင်းအတွင်း ရွှေ့ပြောင်းစိုက်ပျိုးခြင်း ပြုလုပ်ပါသလား။ ပျိုးအိပ်ဖြင့် ပျိုးထောင်ထားသော ဒီရေတောပျိုးပင်များအား မြေတွင် အမြစ်စွဲနေပါက စိုက်ခင်းအတွင်းသို့ ရွှေ့ပြောင်းမစိုက်မီ အမြစ်ဖြတ်ခြင်းဖြင့် ဒဏ်ခံနိုင်အောင် ကြိုတင်ဆောင်ရွက်ပါသလား။	
၃၅။	သမ္မုကြီးကဲ့သို့သော ဒီရေတောသစ်မျိုးကို ပျိုးဥယျာဉ်တွင်ကြိုတင်ပျိုးထောင်၍ ပျိုးအိပ်/မြေလုံးမပါဘဲ စိုက်ခင်းအတွင်း ရွှေ့ပြောင်းစိုက်ပျိုးခြင်းပြုလုပ်ပါသလား။	
၃၆။	ဗြူ ကဲ့သို့သော ဒီရေတောမျိုးစေ့အားမြေတွင် တိုက်ရိုက်စိုက်ပျိုးခြင်း ပြုလုပ်ပါသလား။	
၃၇။	မကြာခဏ ရေလွှမ်းမိုးခြင်းကိုခံရသော အောက်ပိုင်းဒေသများတွင် Rhizophora ဗြူခြေထောက်အဖို၊ ဗြူခြေထောက်အမ Rhizophora apiculate, Rhizophora mucronate, Rhizophora mangle (red mangrove) ကဲ့သို့သော မျိုးစိတ်များကို ဒေသပတ်ဝန်းကျင်နှင့် ဂေဟစနစ်လိုအပ်ချက်များအတွက် ရွေးချယ်စိုက်ပျိုးခြင်း ပြုလုပ်ပါသလား။	
၃၈။	မကြာခဏ ရေလွှမ်းမိုးမှုနည်းသော မြင့်မားသော အမြင့်များတွင် Avicennia သမ္မုကြူ၊ သမ္မုကြီး၊ သမ္မုကြက်တက်၊ Avicennia marina, Avicennia officinalis, Sonneratia alba, Sonneratia caseolaris, Bruguiera cylindrica, Bruguiera gymnorhiza (large-leafed mangrove) Nypa fruticans ကဲ့သို့သော မျိုးစိတ်များကို ဒေသပတ်ဝန်းကျင်နှင့် ဂေဟစနစ်လိုအပ်ချက်များအတွက် ရွေးချယ်စိုက်ပျိုးခြင်းပြုလုပ်ပါသလား။	

စဉ်	အဆက်အစပ် Relevancy	ရမှတ်
၃၉။	ဒီရေတောများ ပြန်လည်စိုက်ပျိုးခြင်းစီမံကိန်းမှ ရွေးချယ်ထားသော <i>Bruguiera</i> (ဗြူ), <i>Sonneratia apetala</i> (ကန့်ပလာ Kanbala), <i>Avicennia officinalis</i> (သမဲ့ကြီး Thame Gyi), <i>Avicennia marina</i> (သမဲ့ဖြူ Thame Phyu), <i>Xylocarpus moluccensis</i> (ကျန Kyana), <i>Aegialitis rotundifolia</i> (Sarthar), <i>Lumnitzera racemose</i> (အိပ်မသွယ် Aeik ma thwe), <i>Heritiera fomes</i> (Kanazo), <i>Ceriops decandra</i> (မဒမ Madama) မျိုးစိတ်များသည် ဒေသပတ်ဝန်းကျင်နှင့် ဂေဟစနစ် လိုအပ်ချက်များအတွက် သင့်လျော်မှုရှိပါသလား။	
၄၀။	Lower intertidal zone, Higher elevations with less frequent inundation zone ဒီရေလွှမ်းမိုးမှုများသော အနိမ့်ပိုင်းဇုန်၊ ရေလွှမ်းမိုးမှုနည်းသော မြင့်မားသော အမြင့်ပိုင်းဇုန်၊ ရာသီဥတု၊ အပူအအေး၊ စိုထိုင်းဆ၊ မြေစိုစွတ်မှု၊ မြေခြောက်သွေ့မှု စသဖြင့်ခွဲခြား၍ မြေအနိမ့်အမြင့်အလိုက် သင့်လျော်မှန်ကန်သည့်သစ်မျိုးကို Right Species on Right Site ဖြစ်စေရန် မှန်ကန်စွာ ရွေးချယ်စိုက်ပျိုးပါသလား။	
၄၁။	ဒီရေတောစိုက်ခင်းစိုက်ရန် မြေနေရာရှင်းလင်းခြင်းကြောင့် ရှားပါးသစ်မျိုးများ၊ မျိုးစေ့ထုတ်ပေးသည့် မိခင်အပင်များ ခုတ်လှဲမခံရအောင် ထိန်းသိမ်းဆောင်ရွက်ပါသလား။	
၄၂။	ဇီဝမျိုးစုံမျိုးကွဲပေါကြွယ်ဝစေရန် သစ်တစ်မျိုးထဲကို စိုက်ပျိုးခြင်းအား ရှောင်ကျဉ်ပါသလား။ သစ်မျိုးစုံစိုက်ပါသလား။	
၄၃။	ဒီရေတောသစ်မျိုးစုံပါဝင်သည့် သဘာဝဒီရေတော/ စိုက်ခင်း/ ဥယျာဉ်၊ သစ်စေ့ထုတ် ဧရိယာများ တည်ထောင်ထိန်းသိမ်းထားပါသလား။	
၄၄။	ပလတ်စတစ်အိတ်ဖြင့် ပျိုးထောင်ထားသော ဒီရေတောပျိုးပင်များကို စိုက်ခင်းအတွင်း ရွှေ့ပြောင်းစိုက်ပျိုးပြီးနောက် ပလတ်စတစ်အိတ်များကို စိုက်ခင်းအတွင်း စည်းကမ်းမဲ့ မစွန့်ပြစ်ရေး ဆောင်ရွက်လျက်ရှိပါသလား။ ပတ်ဝန်းကျင်ထိခိုက်မှု ဆိုးကျိုးများ မဖြစ်ပေါ်စေရေးအတွက် ပလတ်စတစ်ပျိုးအိတ်များကို ဒီရေတောစိုက်ခင်း/မြစ်ချောင်းအတွင်း မစွန့်ပစ်ရန် စည်းကမ်းတကျ ဆောင်ရွက်နေပါသလား။	

၄။ ဒေသခံပြည်သူအစုအဖွဲ့ CFUG, ဆက်စပ်ပတ်သက်သူများပူးပေါင်း၍ စောင့်ကြည့်လေ့လာခြင်း၊ အကဲဖြတ်ခြင်း၊ သင်ယူခြင်းနှင့် ပြုပြင်ထိန်းသိမ်းခြင်း။ Participatory Monitoring, Evaluation and Learning စီမံကိန်းရည်မှန်းချက်များနှင့် သက်ဆိုင်သည့် အဓိကညွှန်းကိန်းများကို ဒေသခံပြည်သူအစုအဖွဲ့ CFUG, ဆက်စပ်ပတ်သက်သူများ ပူးပေါင်း၍ စဉ်ဆက်မပြတ် စောင့်ကြည့်လေ့လာခြင်း၊ အကဲဖြတ်ခြင်း၊ သင်ယူခြင်း Participatory Monitoring, Evaluation and Learning။

စဉ်	အဆက်အစပ် Relevancy	ရမှတ်
	(က) ဒေသခံပြည်သူ အစုအဖွဲ့ ပိုင်ဒီရေတောစိုက်ခင်း၏ ရှင်ပင်% နှင့် ဒီရေတောပင်များ အောင်မြင်ရှင်သန်ကြီးထွားမှု (အပင်အမြင့်၊ လုံးပါတ်၊ တစ်ဧက ပါဝင်ပေါက်ရောက်ပင်) ကောင်းပါသလား။	
၄၅။	သင်၏ ဒေသခံပြည်သူအစုအဖွဲ့ပိုင် သစ်တောအတွင်းရှိ စီမံကိန်းမှ စိုက်ပျိုးပေးခဲ့သော ဒီရေတောသစ်ပင်များသည် ရှင်သန်မှုရာခိုင်နှုန်းကောင်းပါသလား။	
၄၆။	သင်၏ ဒေသခံပြည်သူအစုအဖွဲ့ပိုင်သစ်တောအတွင်းရှိ စီမံကိန်းမှစိုက်ပျိုးပေးခဲ့သော ဒီရေတောသစ်ပင်များသည် ကြီးထွားမှုကောင်းပါသလား။	
၄၇။	သင်၏ ဒေသခံပြည်သူအစုအဖွဲ့ပိုင်သစ်တောတွင် သစ်တောဖုန်းလွှမ်းမှု ကောင်းပါသလား။	
၄၈။	သင်၏ ဒေသခံပြည်သူအစုအဖွဲ့ပိုင်သစ်တောတွင် သဘာဝအလျှောက် သစ်စေ့မှပေါက်လာသည့် ဒီရေတောပင်နှင့် ပျိုးဥယျာဉ်တွင် ကြိုတင်ပျိုးထောင်ပြီး စိုက်ခင်းအတွင်း ရွှေ့ပြောင်းစိုက်ပျိုးထားသည့် ဒီရေတောပင်များ၏ ရှင်သန်မှုရာခိုင်နှုန်းနှင့် ကြီးထွားမှုနှုန်းယှဉ်ပါက စိုက်ပျိုးခဲ့သည့် ဒီရေတောပင်က ပိုမိုကောင်းပါသလား။	
	(ခ) ဇီဝမျိုးစုံမျိုးကွဲများပေါကြွယ်ဝမှု	
၄၉။	ဧရာဝတီတိုင်းဒေသကြီးတွင် ဒီရေတောမျိုးစိတ်မျိုးကွဲပေါင်း (၈၈) မျိုးရှိသကဲ့သို့ သင်၏ ဒေသခံပြည်သူအစုအဖွဲ့ပိုင် သစ်တောတွင် ဒီရေတောမျိုးစိတ်မျိုးကွဲများ ပေါများပါသလား။	
၅၀။	သင်၏ ဒေသခံပြည်သူအစုအဖွဲ့ပိုင် သစ်တောတွင် ရှားပါသည့် ဒီရေတောသစ်မျိုး၊ မျိုးသုဉ်းပျောက်ကွယ်သွားနိုင်သည့် ဒီရေတောသစ်မျိုးကို စိုက်ပျိုးထိန်းသိမ်းစောင့်ရှောက်ထားပါသလား။	
၅၁။	သင်၏ ဒေသခံပြည်သူအစုအဖွဲ့ပိုင်သစ်တောတွင် ရှားပါသည့်တောရိုင်းတိရစ္ဆာန်မျိုး၊ မျိုးသုဉ်းပျောက်ကွယ်သွားနိုင်သည့် တောရိုင်းတိရစ္ဆာန်မျိုးများကို ထိန်းသိမ်းစောင့်ရှောက်ထားပါသလား။	
၅၂။	သင်၏ ဒေသခံပြည်သူအစုအဖွဲ့ပိုင်သစ်တောတွင် သစ်မျိုးတစ်မျိုးထဲကိုသာ ဧရိယာကျယ်ကျယ်ပြန့်ပြန့် မစိုက်ဘဲ ဒီရေတောသစ်မျိုးပေါင်းစုံကို ရေနှော စိုက်ပျိုးလျက်ရှိပါသလား။	
	(ဂ) ဒေသခံပြည်သူများ၏ ပူးပေါင်းဆောင်ရွက်မှု	
၅၃။	ဒေသခံ ပြည်သူအစုအဖွဲ့ပိုင်သစ်တော အုပ်ချုပ်လုပ်ကိုင်မှုစီမံချက်ရေးဆွဲခြင်း၊ အကောင်အထည်ဖော်ခြင်း၊ ဒီရေတောပြန်လည်တည်ထောင်စိုက်ပျိုးခြင်း၊ ဆက်လက်ထိန်းသိမ်းခြင်း၊ သစ်တောထွက်ပစ္စည်းများ ခုတ်လှဲထုတ်ယူခြင်း၊ ကင်းလှည့် စောင့်ရှောက်ခြင်းလုပ်ငန်းများ ဆောင်ရွက်ရာတွင် အများသဘောတူညီချက်ရရှိရေးအတွက် အုပ်ချုပ်လုပ်ကိုင်မှုကော်မတီနှင့် အသုံးပြုသူအဖွဲ့ဝင်များသည် ပုံမှန်အစည်းအဝေးကျင်းပပါသလား။	
၅၄။	ဒေသခံ ပြည်သူအစုအဖွဲ့ပိုင်သစ်တော အုပ်ချုပ်လုပ်ကိုင်မှုစီမံချက်နှင့်အညီ စီမံကိန်းမှ စိုက်ပျိုးတည်ထောင်ပေးခဲ့သည့် ဒီရေတောစိုက်ခင်းများ၊ သို့မဟုတ် လက်ရှိသဘာဝဒီရေတောများကို ပိုမိုတိုးတက်ကောင်းမွန်အောင် ပြုစုထိန်းသိမ်းခြင်းလုပ်ငန်းအား ဒေသခံပြည်သူ/အသုံးပြုသူများအဖွဲ့မှ ဆက်လက်ဆောင်ရွက်လျက်ရှိပါသလား။	

စဉ်	အဆက်အစပ် Relevancy	ရမှတ်
၅၅။	စီမံကိန်းမှ စိုက်ပျိုးတည်ထောင်ပေးခဲ့သည့် ဒီရေတော စိုက်ခင်းများ၊ သို့မဟုတ် လက်ရှိ သဘာဝဒီရေတောများကို ပြင်ပမှဝင်ရောက်ခြင်း၊ ထုတ်ယူခြင်း၊ ကျူးကျော်ခြင်းများအား ကာကွယ်ခြင်း၊ ပုံမှန် ကင်းလှည့်ထိန်းသိမ်းခြင်းလုပ်ငန်းအား ဆောင်ရွက်လျက်ရှိပါသလား။	
၅၆။	ဒေသခံပြည်သူများသည် ၎င်းတို့၏စွန့်ပစ်လယ်မြေများကို ဒီရေတော သစ်ပင်များစိုက်ပျိုး၍ ဒေသခံပြည်သူအစုအဖွဲ့ပိုင်သစ်တောအဖြစ် တည်ထောင်ခဲ့ခြင်းမျိုး ရှိပါသလား။	
၅၇။	ဒေသခံပြည်သူအစုအဖွဲ့ပိုင်သစ်တောတွင် ဒီရေတောသစ်ပင်များ စိုက်ပျိုးထားသောမြေ အား လယ်မြေ၊ ပုဇွန်ကန်၊ ငါးကန်အဖြစ် မြေပြောင်းလဲအသုံးမပြုရန် ထိန်းသိမ်းကာကွယ် စောင့်ရှောက်ထားနိုင်ခဲ့ပါသလား။	
၅၈။	ပုဇွန်ခြောက်ပြုလုပ်ရန် လိုအပ်သောထင်းကို ဒေသခံပြည်သူအစုအဖွဲ့ပိုင် ဒီရေတော စိုက် ခင်းအတွင်းမှ သစ်ပင်များခုတ်၍မသုံးစွဲရန် ထိန်းသိမ်းကာကွယ်စောင့်ရှောက်လျက်ရှိပါ သလား။	
၅၉။	အိမ်တိုင်ခြံတိုင်လယ်ယာလုပ်ငန်း၊ ရေလုပ်ငန်းများတွင် အသုံးပြုရန် ဒေသခံပြည်သူအစုအဖွဲ့ ပိုင် ဒီရေတောစိုက်ခင်းအတွင်းမှ သစ်ပင်များခုတ်၍ မသုံးစွဲရန် ထိန်းသိမ်းကာကွယ်စောင့် ရှောက်လျက်ရှိပါသလား။	
၆၀။	ဒေသခံပြည်သူအစုအဖွဲ့ပိုင် သစ်တောအုပ်ချုပ်လုပ်ကိုင်မှု စီမံချက်အရ ဒေသခံပြည်သူအစု အဖွဲ့ပိုင် ဒီရေတောစိုက်ခင်းအတွင်းမှ သစ်ပင်များ ခုတ်လှဲထုတ်ယူရာတွင် ဒီရေတောများ ရေရှည်တည်တံ့စေမည့် သစ်နှင့်သစ်တောထွက်ပစ္စည်းများကို စနစ်တကျထုတ်ယူ သုံးစွဲ နည်းကို ကျင့်သုံးပါသလား။	
၆၁။	ဓမ္မတာမျိုးဆက်ခြင်းရရှိစေရန် ခုတ်ကွက်အလိုက် (သို့မဟုတ်) ကွက်ကျော်/လှိုင်းကျော် အပြောင်ရှင်းခုတ်လှဲနည်းစနစ်ဖြင့် ဒေသခံပြည်သူအစုအဖွဲ့ပိုင် ဒီရေတောမှ သစ်/တိုင်/ မျော/ ထင်းကို စနစ်တကျခုတ်လှဲ စုဆောင်းထုတ်ယူခြင်းစနစ် Clear-felling (in blocks or in alternate strips) ကိုကျင့်သုံးပါသလား။	
၆၂။	ဒေသခံပြည်သူအစုအဖွဲ့ပိုင် ဒီရေတောတွင် မျိုးဆက်ပင်ပေါက်များ ရှိ-မရှိ လေ့လာ၍ မျိုး ဆက်ပင်ပေါက်များရှိမှသာ မိမိအသုံးလိုသည့် သစ်ပင်၊ အသုံးချနိုင်မည့် အရွယ် အစားရှိသည့် သစ်မျိုးကို ရွေးချယ်ခုတ်လှဲနည်းစနစ် (Selection System) ဖြင့် သစ်/တိုင်/မျော/ ထင်း/ မီးသွေးကို ခုတ်လှဲစုဆောင်းထုတ်ယူပါသလား။	
၆၃။	ဒေသခံ ပြည်သူအစုအဖွဲ့ပိုင် ဒီရေတောမှ သစ်/တိုင်/မျော/ထင်း/မီးသွေးကို ခုတ်လှဲစု ဆောင်းထုတ်ယူရာတွင် “မျိုးဆက်ပင်ပေါက်များ ရှိ-မရှိ မလေ့လာဘဲ မိမိအသုံးလိုသည့် သစ်ပင်၊ အသုံးချနိုင်မည့် အရွယ်အစားရှိသည့် သစ်မျိုးကိုရွေးချယ်ကာ ခုတ်လှဲထုတ်ယူခြင်း စနစ် (Logger selective” cutting) ကဲ့သို့သော ဒီရေတောများ ပျက်စီးပြုန်းတီးစေသည့် စနစ်ကိုမကျင့်သုံးရန် တားမြစ်ပိတ်ပင်ထားပါသလား။	

စဉ်	အဆက်အစပ် Relevancy	ရမှတ်
၆၄။	ဒေသခံပြည်သူအစုအဖွဲ့ပိုင် ဒီရေတောတွင် မိခင်အပင်များချန်ထားပြီး ၎င်းမိခင်အပင်မှ ရရှိသော သစ်စေ့များမှ မျိုးဆက်အပင်ပေါက်များပေါက်လာပြီး ရှင်သန်ကြီးထွားသည့်အချိန် ကျမှသာ အုပ်စိုးနေသည့် မိခင်အပင်များကို အလှည့်ကျခုတ်လှဲထုတ်ယူခြင်းစနစ် Shelter wood System ကို ကျင့်သုံးပါသလား။	
၆၅။	အဖိုးတန်အပင်၊ ရှားပါးအပင်၊ သစ်စေ့ထုတ်အပင်၊ မိခင်အပင်များကိုချန်ထားပြီး ကျူးကျော်မျိုးစိပ်အပင်၊ ခရာဆူးခြုံအပင်၊ ပေါင်းပင်များရှင်းလင်း၍ ကွက်လပ်များတွင် ဒီရေတောအပင်စိုက်ခြင်း ဆောင်ရွက်ပါသလား။	

၅။ အလယ်အလတ်ကာလ ပြန်လည်သုံးသပ်ခြင်း လုပ်ငန်းဆောင်ရွက်၍ လိုက်လျောညီထွေဖြစ်သော စီမံခန့်ခွဲမှုဗျူဟာများ ကျင့်သုံးခြင်း။

စဉ်	အဆက်အစပ် Relevancy	ရမှတ်
	(က) လိုက်လျောညီထွေဖြစ်သော စီမံခန့်ခွဲမှုဗျူဟာ	
၆၆။	ဒီရေတောပြန်လည်ထူထောင်ရေးစီမံကိန်း ဆောင်ရွက်ခဲ့ရာတွင် ပေါ်ပေါက်လာသော စိန်ခေါ်မှုများ သို့မဟုတ် အခွင့်အလမ်းများကို ကိုင်တွယ်ဖြေရှင်းရန် လိုက်လျောညီထွေဖြစ်သော စီမံခန့်ခွဲမှုဗျူဟာများကို ကျင့်သုံးမှုရှိပါသလား။	
၆၇။	စွန့်ပြစ်လယ်မြေများတွင် ဒီရေတောသစ်ပင်များ ပြန်စိုက်ပြီးနောက် သစ်ပင်များပြန်ခုတ်၍ စပါးပြန်မစိုက်အောင် လိုက်လျောညီထွေဖြစ်သော စီမံခန့်ခွဲမှုဗျူဟာ (ဥပမာ-တာဝန်ယူမှု၊ တာဝန်ခံမှုရှိသော စိုက်ပျိုးရေး ရင်းနှီးမြှုပ်နှံမှု [Responsible Agricultural Investment] ကို ကျင့်သုံးပါသလား။	
၆၈။	ဒီရေတော ပြန်လည်ထူထောင်ရေးစီမံကိန်းအရ ဒေသခံပြည်သူအစုအဖွဲ့ပိုင် သစ်တောတွင် ဒီရေတောသစ်ပင်များ စိုက်ပျိုးပေးပြီးနောက် ပေါ်ပေါက်လာသော စိန်ခေါ်မှုများ (ဥပမာ တရားမဝင်ခုတ်လှဲခြင်း၊ လယ်မြေအဖြစ်ပြောင်းခြင်း၊ ပုစွန်ခြောက်ပြုလုပ်ရန် ထင်းအလွန် အကျွံထုတ်ယူသုံးစွဲခြင်း၊ မြေရောင်းချခြင်း) စသည့်စိန်ခေါ်မှုများကို ကိုင်တွယ်ဖြေရှင်းရာတွင် လိုက်လျောညီထွေဖြစ်သော စီမံခန့်ခွဲမှုဗျူဟာများကို ကျင့်သုံးမှုရှိပါသလား။	
၆၉။	ဝင်ငွေတိုးစေရန် ဒေသခံပြည်သူအစုအဖွဲ့ပိုင် သစ်တောလုပ်ငန်းကိုအခြေခံသော စီးပွားရေး လုပ်ငန်း Community Forest based Enterprise-CFE ဆောင်ရွက်ရန် အခွင့်အလမ်း များပေါ်ပေါက်လာပါက CFE လုပ်ငန်း ထူထောင်လုပ်ကိုင်လျက်ရှိပါသလား။ (ဥပမာ သဘာဝကို အခြေခံသော ဂဏန်းမွေးမြူခြင်း စီးပွားရေးလုပ်ငန်း၊ အရင်းမပြောက်မတည် ငွေဖြင့် အသေးစားငွေကြေးလုပ်ငန်း)	

၆။ အကဲဖြတ်ခြင်းနှင့် နိဂုံးချုပ်ခြင်း

စီမံကိန်း၏ရလဒ်များနှင့် အကျိုးသက်ရောက်မှုများသည် ၎င်း၏ကနဦး ရည်မှန်းချက်များ နှင့် FREDa and ACTMANG တို့၏မျှော်လင့်ချက်များနှင့် ကိုက်ညီမှုအခြေအနေ။

စဉ်	အဆက်အစပ် Relevancy	ရမှတ်
	(က) ရည်မှန်းချက်များ မျှော်လင့်ချက်များနှင့် ကိုက်ညီမှု အခြေအနေ။ ဒေသခံပြည်သူအစုအဖွဲ့ပိုင် သစ်တောအုပ်ချုပ်လုပ်ကိုင်မှုစီမံချက်နှင့် ဒီရေတော ပြန်လည်တည်ထောင်ရေးစီမံကိန်းမှ မျှော်လင့်ချက်များရရှိမှု အခြေအနေ။	
၇၀။	ဒေသခံပြည်သူများအတွက် သစ်နှင့် သစ်မဟုတ်သောသစ်တောထွက်ပစ္စည်း အစရှိသည့် သစ်တောနှင့်သစ်ပင်ဆိုင်ရာ အခြေခံလိုအပ်ချက်များကို ဖြည့်ဆည်းပေးလျက်ရှိပါသလား။	
၇၁။	ဒေသခံပြည်သူများအတွက် အလုပ်အကိုင်နှင့် ဝင်ငွေအခွင့်အလမ်းများ ရရှိနေပါသလား။	
၇၂။	သစ်တောဖုံးလွှမ်းသည့် ဧရိယာ တိုးတက်လာပါသလား။ ရေရှည်တည်တံ့ပြီး စဉ်ဆက်မပြတ် ထုတ်ယူသုံး စွဲနိုင်ပါသလား။	
၇၃။	သစ်တောစီမံအုပ်ချုပ်လုပ်ကိုင်မှုတွင် ပြည်သူများပူးပေါင်းပါဝင်မှုရှိပါသလား။	
၇၄။	သစ်တောပြုန်းတီးခြင်းနှင့် အရည်အသွေးကျဆင်းခြင်းတို့ကို ကာကွယ်ထိန်းသိမ်းခြင်းဖြင့် ရာသီဥတုပြောင်းလဲမှု လျော့ချရေးနှင့် လိုက်လျောညီထွေဖြစ်စေရေး အထောက်အကူဖြစ်စေ နိုင်သည့် ပတ်ဝန်းကျင်ဆိုင်ရာ ဝန်ဆောင်မှုများ တိုးပွားလာပါသလား။	
	အဆက်အစပ် Relevancyရှိမှု ပေးမှတ်စုစုပေါင်း ၇၄	
	အဆက်အစပ် Relevancyရှိမှု ရမှတ်စုစုပေါင်း	
	အဆက်အစပ် Relevancyရှိမှု ရာခိုင်နှုန်း	

(ခ) ထိရောက်မှု Effectiveness

စဉ်	ထိရောက်မှု Effectiveness	ရမှတ်
၁။	ဒီရေတောပြန်လည်ထူထောင်ရေး စီမံကိန်း Phase I to Phase V ၌ ပြင်ဒရယ် ကြိုးဝိုင်း အတွင်းရှိ ဒေသခံပြည်သူအစုအဖွဲ့ပိုင်သစ်တောများတွင် ဒီရေတောပြန်လည်စိုက်ပျိုးတည်ထောင်ရန် မြေနေရာရွေးချယ်ရာ၌ အသုံးပြုသူအဖွဲ့ဝင်များနှင့် လွတ်လွတ်လပ်လပ်၊ ကြိုကြို တင်တင် ညှိနှိုင်းဆွေးနွေးအသိပေးမှု FPIC ပြုလုပ်ကာ ဒေသခံပြည်သူအစုအဖွဲ့ပိုင် သစ်တော အသုံးပြုသူအဖွဲ့ဝင်များနှင့် သဘောတူညီချက်ရယူမှု ပြုလုပ်ခဲ့ပါသလား။	
၂။	FREDa and ACTMANG တို့၏ မျှော်မှန်းချက်ပန်းတိုင်ဖြစ်သည့် ဒီရေတော ပြန်လည်ဖုံးလွှမ်းရေးအတွက် အသုံးပြုသူအဖွဲ့ဝင်များက သဘောတူညီခဲ့ပါသလား။	
၃။	ဒီရေတော ပြန်လည်ထူထောင်ရေးစီမံကိန်းတွင် ပါဝင်သော လုပ်ငန်းအစီအစဉ်များတွင် ဒေသခံပြည်သူများ ပူးပေါင်းဆောင်ရွက်ရန် သဘောတူညီမှုရယူခဲ့ပါသလား။	
၄။	ဒီရေတောပြန်လည်ထူထောင်ရေးစီမံကိန်း အောင်မြင်ရေးအတွက် ဒေသခံပြည်သူများက သဘောတူညီမှုရှိပါသလား။	

စဉ်	ထိရောက်မှု Effectiveness	ရမှတ်
၅။	ဒီရေတောပြန်လည်ထူထောင်ရေးစီမံကိန်း Phase I to Phase V အရ ပြင်ဒရယ် ကြိုးဝိုင်း အတွင်းရှိ ဒေသခံပြည်သူအစုအဖွဲ့ပိုင် သစ်တောများတွင် ဒီရေတောပြန်လည်စိုက်ပျိုး တည်ထောင်ခြင်းလုပ်ငန်းများ အောင်မြင်ပါသလား။ သစ်တောဖုန်းလွှမ်းမှုတိုးတက်လာပါသလား။ ခုတ်လှဲဖျက်ဆီးမှုများကို တားဆီးနိုင်ခဲ့ပါသလား။	
၆။	ဒီရေတောပြန်လည်ထူထောင်ရေးစီမံကိန်းတွင် တွေ့ကြုံရသော အခက်အခဲ၊ ပြဿနာများ သို့မဟုတ် စိန်ခေါ်မှုများကို အောင်မြင်စွာဖြေရှင်းနိုင်ခဲ့ပါသလား။	
၇။	ဒီရေတောပြန်လည်ထူထောင်ရေးစီမံကိန်း Phase I to Phase V ကာလတစ်လျှောက် စောင့်ကြည့်လေ့လာခြင်း Monitoring လုပ်ငန်းကို FREDA, ACTMANG, CFUG တို့ ပူးပေါင်းဆောင်ရွက်ခဲ့ပါသလား။	
၈။	ဒီရေတောပြန်လည်ထူထောင်ရေးစီမံကိန်း အကောင်အထည်ဖော်ရေးတာဝန်ယူသည့် စီမံကိန်းမန်နေဂျာ၊ စီမံကိန်းဝန်ထမ်းများ၊ အသုံးပြုသူအဖွဲ့ဝင်များသည် စောင့်ကြည့်လေ့လာခြင်း Monitoring လုပ်ငန်းဆောင်ရွက်ခဲ့ရာတွင် တွေ့ရှိခဲ့ရသော အောင်မြင်သည့် ဒေသခံပြည်သူအစုအဖွဲ့ပိုင်သစ်တော အသုံးပြုသူအဖွဲ့ဝင်များ ကျင့်သုံးသည့် စံနမူနာ/အတုယူဖွယ်ရာအချက်များကို လေ့လာအတုယူ၍ ပိုမိုအောင်မြင်သည့် ဒေသခံပြည်သူအစုအဖွဲ့ပိုင်သစ်တောများ များသထက်များလာအောင် ကြိုးစားဆောင်ရွက်ပါသလား။ (ဥပမာ - အောင်မြင်သည့် ဒေသခံပြည်သူအစုအဖွဲ့ပိုင် သစ်တောအသုံးပြုသူများတွင် တွေ့ရသော တက်ကြွမှု (be proactive), စိတ်ထဲ၌ အဆုံးသတ်ဖြင့်စတင်မှု (Begin with the end in mind), အရေးကြီးမှုအပေါ်အခြေခံ၍ ဦးစားပေးလုပ်ကိုင်တတ်မှု (Put First Things First) နှစ်ဦးနှစ်ဖက်အကျိုးရှိသော အဖြေများကိုရှာ၍ စဉ်းစားဆောင်ရွက်တတ်မှု (Think Win-Win) တခြားသူတွေရဲ့ အမြင်နဲ့ခံစားချက် Other People's View တွေကို လေးလေးနက်နက်နားလည်ဖို့ ကြိုးစားပြီး မိမိ၏ကိုယ်ပိုင်စိတ်ကူးများ သို့မဟုတ် ထင်မြင်ချက်များကို ဖော်ပြဆောင်ရွက်တတ်မှု(Seek First to Understand, Then to Be Understood) ဘုံရည်မှန်းချက်များအောင်မြင်ရန် အတူတကွလုပ်ဆောင်မှု (Synergize) မိမိကိုယ်ကို ဂရုစိုက်မှု၊ သင်ယူမှု၊ တွေးခေါ်မှုနှင့် အောင်မြင်တိုးတက်မှု အတွက် ကြိုးစားအားထုတ်မှု (Sharpen the Saw) များပြုလုပ်ပါသလား။	
၉။	ဒီရေတောပြန်လည်ထူထောင်ရေးစီမံကိန်း Phase I to Phase V ကာလအတွင်း မအောင်မြင်သည့်စိုက်ခင်းများ၏ ကျရှုံးမှုကို သင်ယူခြင်းနှင့် နှစ်စဉ်ဆောင်ရွက်မည့် ဒီရေတောစိုက်ခင်းတည်ထောင်ခြင်းလုပ်ငန်းများ တိုးတက်အောင်မြင်စေရန်အတွက် အခွင့်အလမ်းတစ်ခု အဖြစ်ရှုမြင်ကာ ဆောင်ရွက်ပါသလား။	

စဉ်	ထိရောက်မှု Effectiveness	ရမှတ်
၁၀။	ဒီရေတောပြန်လည်ထူထောင်ရေးစီမံကိန်း Phase I to Phase V ကာလအတွင်း မအောင်မြင်သည့် စိုက်ခင်းများ၏ကျရှုံးမှုကို ပြန်လည်သုံးသပ်ပြီး ခွဲခြမ်းစိတ်ဖြာခြင်း၊ အမှားအယွင်းများကို ခွဲခြမ်းစိတ်ဖြာခြင်းများ ပြုလုပ်ပါသလား။ မအောင်မြင်သည့် စိုက်ခင်းများ၏ လုပ်ဆောင်ချက်များ၊ ဆုံးဖြတ်ချက်များနှင့် ပြင်ပအခြေအနေများအပါအဝင် ကျရှုံးမှုကိုဖြစ်စေသော အကြောင်းရင်းများကို သုံးသပ်ကာ သင်ယူလေ့လာပြီး နှစ်စဉ်ဆောင်ရွက်မည့် ဒီရေတောစိုက်ခင်း တည်ထောင်ခြင်းလုပ်ငန်းများ တိုးတက်အောင်မြင်စေရန် ဆောင်ရွက်ခဲ့ပါသလား။	
၁၁။	ဒီရေတောပြန်လည်ထူထောင်ရေးစီမံကိန်း Phase I to Phase V ကာလအတွင်း မအောင်မြင်သည့်စိုက်ခင်းများ၏ ကျရှုံးမှုမှသင်ခန်းစာများကို ထုတ်ယူကာ အနာဂတ်လုပ်ဆောင်ချက်များနှင့် ဆုံးဖြတ်ချက်များရေးဆွဲ ချမှတ်ရာတွင် ဤသင်ခန်းစာများကို အသုံးပြုခဲ့ပါသလား။	
၁၂။	ဒီရေတောပြန်လည်ထူထောင်ရေးစီမံကိန်း Phase I to Phase V ကာလအတွင်း မအောင်မြင်သည့် စိုက်ခင်းများမှ သင်ယူခဲ့သည့်သင်ခန်းစာများအပေါ် အခြေခံ၍ နည်းဗျူဟာကို ပြုပြင်ပြောင်းလဲခြင်း၊ အားနည်းချက်များကို ကိုင်တွယ်ဖြေရှင်းခြင်း၊ စီမံကိန်း အကောင်အထည်ဖော်သူများ၏ ကျွမ်းကျင်မှု သို့မဟုတ် အသိပညာကိုမြှင့်တင်ခြင်းများ ဆောင်ရွက်ခဲ့ပါသလား။	
၁၃။	ရှင်းလင်းသောပန်းတိုင်များနှင့်အစီအစဉ်များကိုချမှတ်ပြီး၎င်းတို့ကိုအောင်မြင်ရန်အစီအစဉ်ရေးဆွဲဆောင်ရွက်ခြင်း၊ အောင်မြင်မှုအတွက် ဆောင်ရွက်ရမည့် လုပ်ငန်းစီမံချက်ဇယားများချမှတ်ခြင်း၊ ပြတ်သားသော ဦးတည်ချက်နှင့် အစီအစဉ်ရေးဆွဲဆောင်ရွက်ခြင်း၊ အတိတ်ကအမှားများကို ထပ်ခါထပ်ခါမဖြစ်စေရန် ဆောင်ရွက်ကြပါသလား။	
၁၄။	လုပ်ဖော်ကိုင်ဖက်များ၊ လမ်းညွှန်မှုပေးသည့် FREDA Central Committee Members, Executive Committee Members, ACTMANG မှ Japanese Expert သို့မဟုတ် သူငယ်ချင်းများထံမှဖြစ်စေ အခြားသူများထံမှဖြစ်စေ တုံ့ပြန်ချက်များ၊ အကြံဉာဏ်များရယူကာ ပိုမိုကောင်းမွန် တိုးတက်အောင်မြင်စေရေးအတွက် ဆောင်ရွက်ခဲ့ပါသလား။	
၁၅။	ကျရှုံးမှုကိုရင်ဆိုင်ရာတွင် အပြုသဘောဆောင်သော စိတ်သဘောထားကို ထိန်းသိမ်းကာ ဇွဲရှိရှိနှင့် အတားအဆီးတွေကိုကျော်လွှားပြီး အောင်မြင်မှုပန်းတိုင်သို့ရောက်ရန် ကြိုးပမ်းအားထုတ်ပါသလား။	
၁၆။	အပြုသဘောဆောင်သော အတွေးအမြင်ဖြင့် ကျရှုံးခြင်းကို ချဉ်းကပ်ခြင်း၊ အမှားများမှ သင်ယူခြင်းနှင့် တိုးတက်ရန် တက်ကြွသောခြေလှမ်းများကို လုပ်ဆောင်ခြင်းဖြင့် ဆုတ်ယုတ်မှုများကို တိုးတက်မှုအတွက် အခွင့်အလမ်းများအဖြစ် ပြောင်းလဲနိုင်ပြီး နောက်ဆုံးတွင် အောင်မြင်မှုကို ရရှိအောင်ဆောင်ရွက်ခဲ့ပါသလား။	
၁၇။	ဒီရေတောများ ပြန်လည်ထူထောင်ရေးစီမံကိန်းမှ ရည်ရွယ်ထားသည့်ရလဒ်များ အားလုံးအောင်မြင်မှုရှိပါသလား။ (ဒီရေတောဖုံးလွှမ်းမှု တိုးလာခြင်း၊ စိုက်ပျိုးထားသည့်ဒီရေတောအပင်ငယ်များသည် အသက်အရွယ်၊ အတန်းအစားအလိုက် လုံးပတ်/အမြင့်ကြီးထွားလာခြင်း၊ ရှင်ပင်ရာခိုင်နှုန်းကောင်းခြင်း)	

စဉ်	ထိရောက်မှု Effectiveness	ရမှတ်
၁၈။	ဒီဇိုင်းစံချိုးကွဲများထိန်းသိမ်းရေး ရည်ရွယ်ထားသည့် ရလဒ်များရရှိပါသလား? (သစ်ပင်/တိရစ္ဆာန်မျိုးစုံရှိခြင်း။	
၁၉။	ဒီရေတောများ ပြန်လည်ထူထောင်ရေး စီမံကိန်းဆောင်ရွက်ခြင်းကြောင့် ဒေသခံပြည်သူများ၏ အကျိုးခံစားခွင့်များကို ရရှိပါသလား။	
	ထိရောက်မှု Effectiveness ပေးမှတ်စုစုပေါင်း (၁၉)မှတ်	
	ထိရောက်မှု Effectiveness ရမှတ်စုစုပေါင်း () မှတ်	
	ထိရောက်မှု Effectiveness ရာခိုင်နှုန်း %	

(ဂ) စွမ်းဆောင်ရည် Efficiency

စဉ်	စွမ်းဆောင်ရည် Efficiency	ရမှတ်
၁။	ဒီရေတောများ ပြန်လည်ထူထောင်ရေးစီမံကိန်းအဆင့် Phase I to Phase V အတွင်း (အချိန်၊ ရန်ပုံငွေ၊ ဝန်ထမ်း) စသည့် အရင်းအမြစ်များကို မှန်ကန်စွာခွဲဝေမှု၊ အရင်းအမြစ်များကို ထိရောက်စွာ အသုံးပြုမှုပြုလုပ်ခဲ့ပါသလား။ ဆက်လက်ဆောင်ရွက်မည့် Phase VI အတွက် ခိုင်မာသောအခြေခံအုတ်မြစ်ကို ထူထောင်ခဲ့ပါသလား။	
၂။	ဒီရေတောများ ပြန်လည်ထူထောင်ရေးဆောင်ရွက်မည့် ဒေသခံပြည်သူအစုအဖွဲ့ပိုင် သစ်တောနေရာပြင်ဆင်ရွှေးချယ်ခြင်းနှင့် ဒီရေတောများစိုက်ပျိုးခြင်းတွင် လုပ်အား၊ စက်ကိရိယာနှင့်ပစ္စည်းများကို ထိရောက်စွာ အသုံးပြုခဲ့ပါသလား။	
၃။	ပေါင်းသင်ရှင်းလင်းခြင်း၊ သေပင်ဖာထေးခြင်း၊ တရားမဝင်ခုတ်လှဲခြင်း ကဲ့သို့သော အန္တရာယ်များမှ ကာကွယ်ခြင်းကဲ့သို့သော ပြုပြင်ထိန်းသိမ်းမှုဆိုင်ရာ လုပ်ဆောင်ချက်များကို ထိထိရောက်ရောက် ဆောင်ရွက်ခဲ့ပါသလား။	
၄။	ဒီရေတောများ ပြန်လည်ထူထောင်ရေးစီမံကိန်းအဆင့် Phase I to Phase V အတွင်း အောင်မြင်မှု၊ ဆုံးရှုံးမှုများကို လေ့လာသင်ယူ၍ ဖြစ်ပေါ်ပြောင်းလဲမှုနှင့်လိုက်လျောညီထွေဖြစ်အောင်နှင့် ပြန်လည်သုံးသပ်ကာ အရင်းအမြစ်များ နေရာချထားခြင်း သို့မဟုတ် ပြန်လည်ဦးစားပေးခြင်းများ ဆောင်ရွက်ခဲ့ပါသလား။	
၅။	ဒီရေတောများ ပြန်လည်ထူထောင်ရေးစီမံကိန်းသည် ခွဲဝေသတ်မှတ်ထားသော အချိန်နှင့် ဘတ်ဂျက်အတွင်း ၎င်း၏ရည်မှန်းချက်များ အောင်မြင်ခြင်း ရှိ၊ မရှိ စောင့်ကြည့်လေ့လာခြင်း၊ အရင်းအမြစ်များကို အကျိုးရှိရှိအသုံးပြုခြင်းများ ဆောင်ရွက်ပါသလား။	
	စွမ်းဆောင်ရည် Efficiency ပေးမှတ် စုစုပေါင်း(၅)မှတ်	
	စွမ်းဆောင်ရည် Efficiency ရမှတ် စုစုပေါင်း (၅)မှတ်	
	စွမ်းဆောင်ရည် Efficiency ရာခိုင်နှုန်း	

(ဃ) ရေရှည်တည်တံ့မှု Sustainability

စဉ်	စွမ်းဆောင်ရည် Efficiency	ရမှတ်
၁။	ဒီရေတောများ ပြန်လည်ထူထောင်ရေးစီမံကိန်းမှ တည်ထောင်စိုက်ပျိုးပေးခဲ့သော ဒေသခံ ပြည်သူအစုအဖွဲ့ပိုင် သစ်တောအတွင်းရှိ စိုက်ခင်းများအား ဒေသခံပြည်သူများက ရေရှည် စောင့်ကြည့်ရေးအစီအစဉ်များ၊ ဒေသခံပြည်သူအစုအဖွဲ့ပိုင် သစ်တောအသုံးပြုသူအဖွဲ့ဝင် များ ပုံမှန်အစည်းအဝေးကျင်းပကာ ထိတွေ့ဆက်ဆံမှုဗျူဟာများနှင့် လိုက်လျောညီထွေ ရှိသော စီမံခန့်ခွဲမှု အလေ့အကျင့်များကို ကျင့်သုံးပါသလား။	
၂။	စီမံကိန်းမှ တည်ထောင်စိုက်ပျိုးပေးခဲ့သော ဒေသခံပြည်သူအစုအဖွဲ့ပိုင် သစ်တောအတွင်းရှိ စိုက်ခင်းများမှ သစ်ပင်များ ခုတ်လှဲအသုံးပြု၍ရသော အချိန်တွင် ခုတ်လှဲပြီးနောက် သဘာဝ အတိုင်း ပြန်လည်ဖြစ်ထွန်းမှု မြှင့်တင်ခြင်း၊ ပြန်လည်စိုက်ပျိုးပေးခြင်း ကဲ့သို့သော ရေရှည် တည်တံ့သော သစ်တောစိုက်ပျိုးပြုစုနည်းစနစ်များကို ကျင့်သုံးပါသလား။	
၃။	စီမံကိန်းမှ တည်ထောင်စိုက်ပျိုးပေးခဲ့သော ဒေသခံပြည်သူ အစုအဖွဲ့ပိုင် သစ်တောအတွင်းရှိ စိုက်ခင်းများအား ဒေသခံပြည်သူများပူးပေါင်းပါဝင်မှုဖြင့် စောင့်ကြပ်ကြည့်ရှုခြင်းနှင့် ပြုပြင် ထိန်းသိမ်းခြင်း တာဝန်များကို ထမ်းဆောင်လျက်ရှိပါသလား။	
၄။	စီမံကိန်းမှ တည်ထောင်စိုက်ပျိုးပေးခဲ့သော ဒေသခံပြည်သူအစုအဖွဲ့ပိုင် သစ်တောအတွင်းရှိ စိုက်ခင်းများအား အနာဂတ် ဒီရေတောထိန်းသိမ်းမှုဆိုင်ရာ ကြိုးပမ်းဆောင်ရွက်မှုများအ တွက် စောင့်ကြည့်လေ့လာခြင်း၊ အကဲဖြတ်ခြင်းနှင့် အောင်မြင်မှု၊ ဆုံးရှုံးမှုများကို သင်ယူကာ ပိုမိုတိုးတက်ကောင်းမွန်အောင် ဆောင်ရွက်နေပါသလား။	
၅။	ဒီရေတော ပြန်လည်ထူထောင်ရေးစီမံကိန်း၏ ဆက်စပ်မှု၊ ထိရောက်မှု၊ ထိရောက်မှုနှင့် ရေရှည်တည်တံ့မှုကို အကဲဖြတ်ခြင်းမှာ ကျယ်ကျယ်ပြန့်ပြန့် ချဉ်းကပ်ဆောင်ရွက်မှုများ ရှိပါ သလား။	
၆။	အခြားသော ဆက်စပ်ပတ်သက်သူများ (ဥပမာ MERN, RECOFT, GEDA, ACP, FAO, UNDP, WWF စသည့် အဖွဲ့အစည်းများနှင့်ပူးပေါင်း၍ ဒီရေတောထိန်းသိမ်းခြင်း၊ စိုက်ပျိုးခြင်း၊ ဒေသခံပြည်သူအစုအဖွဲ့ပိုင် သစ်တောဖွံ့ဖြိုးရေးလုပ်ငန်းဆောင်ရွက်ခြင်း၊ စွမ်းဆောင်ရည် မြှင့်တင်ရေးသင်တန်းဖွင့်ခြင်း၊ ဒေသခံပြည်သူအစုအဖွဲ့များနှင့် ပူးပေါင်း၍ စဉ်ဆက်မပြတ် စောင့်ကြည့်လေ့လာ အကဲဖြတ်ခြင်းနှင့်သင်ယူခြင်းများ ဆောင်ရွက်လျက်ရှိပါသလား။	
7>	ဒေသခံပြည်သူအစုအဖွဲ့ပိုင် ဒီရေတောစိုက်ခင်းများ မပြုန်းတီးရေး၊ ရေရှည်တည်တံ့ရေး အတွက် ဒေသခံပြည်သူများသည် ထင်းလောင်စာကုန် သက်သာစေသည့် စွမ်းအားဖြင့် မီးဖိုများကို ထမင်းဟင်းချက်ပြုတ်ရာတွင် ဖြစ်စေ၊ အိမ်တွင်း တနိုင်ငံတပိုင် စီးပွားရေးလုပ်ငန်း (ဥပမာ လက်ဖက်ရည်ဆိုင်၊ စားသောက်ဆိုင်၊ စားသောက်ကုန်ထုတ်လုပ်သည့်လုပ်ငန်း၊ ပုဇွန်ခြောက်ထုတ်သည့်လုပ်ငန်း) များတွင် အသုံးပြုပါသလား	
	Sustainability ရေရှည်တည်တံ့မှုပေးမှတ်စုစုပေါင်း (၇)မှတ်	
	Sustainability ရေရှည်တည်တံ့မှုရမှတ်စုစုပေါင်း ()မှတ်	
	Sustainability ရေရှည်တည်တံ့မှုရာခိုင်နှုန်း	

Attachment 3.

List of respondents who provide answers to the strategic questionnaire to evaluate Relevance, Effectiveness, Efficiency and Sustainability

Sr	Name	Occupation	Address
1	U Than	Secretary	2 Ba Wa thit
2	U Than Htun	Chairman	3 Ba Wa Thit
3	U Saw Je Je	CF Member	Aung Kone
4	U Lay Htun	CF Member	Bo Ba Kone
5	U Kan Myint	Chairman	East Ma Yan
6	U Kyaw Soe Htun	Project Manager	FREDA
7	U Hlaing Min Htun	Chairman	Htan Pin Kone
8	U Win Win	CF Member	Ka Nyin Kone
9	U Saw Htoo Kay Hlaing	CF Member	Kan Gyi Ba Aye Kone
10	U Nyi Nyi Zaw	Chairman	Kan Nar Kwin
11	U Thein Zaw Oo	Chairman	Kywe Tee
12	U Saw Kyaw Sein	Patron	Lay Pin Chaung
13	U Thaw Tar Htun	Chairman	Ma Hmwe Kwin
14	U Kyaw Win Aung	Chairman	Nga Dan Se
15	U Khin Zaw	CFUG Member	Oak Pho Kwin Chaung
16	U Htun Lin Aung	Chairman	Pa Dauk Pin Seik
17	U Ngwe Thein Kyaw	Chairman	Pho Htu Taung Yar
18	<u>U Than Hteik Aung</u>	Chairman	Taw Tuk
19	U Thein Aye	Secretary	Te Pin Seik
20	U Kyaw Myint	CFUG Member	Te Pin Seik
21	U Htun Aye	CF member	Tha Main Pa Le
22	U Min Thein	Chairman	U Pe

Sr	Name	Occupation	Address
23	U Myint Kyaw	Chairman	Wa Pa Na
24.	U Hla Thein	Chairman	Wakone

Attachment 4.

Biodiversity survey on mangrove species at community forests in Pyindaye Reserved forest, Pyarpon township, Ayeyarwaddy region, Myanmar.

Sr	Botanical name	Local Name	Zonation	Abundant, Rare or NIL
1	<u><i>Acanthus ebracteatus Vahl</i></u>	ခရာဖြူ		Rare
2	<u><i>Acanthus ilicifolius L.</i></u>	ခရာခရမ်း		Abundant
3	<u><i>Acanthus volubilis Wall.</i></u>	ခရာနွယ်		Abundant
4	<u><i>Acrostichum aureum Linne</i></u>	ငှက်ကြီးထောင် (အရွက်ကြီး)	high frequency of tidal flooding	Abundant
5	<u><i>Acrostichum speciosum Willd.</i></u>	ငှက်ကြီးထောင် (အရွက်သေး)	high frequency of tidal flooding	Rare
6	<u><i>Aegialitis rotundifolia Roxb.</i></u>	ပင်လယ်ရှား		Rare
7	<u><i>Aegiceras corniculatum (L.) Blanco</i></u>	ရေရား	high frequency of tidal flooding	Rare
8	<u><i>Amoora cucullata (Roxb)</i></u>	ပန့်သကာ	high frequency of tidal flooding	Rare
9	<u><i>Anamirta paniculata</i></u>	ကျီးသေ(ခေါ်) ကျီးလေးနွယ်		Rare
10	<u><i>Ardisia litoralis</i></u>	ရှာတွဲကြက်မောက်		NIL
11	<u><i>Avicennia lanata Ridley</i></u>		intermediate zones.	NIL
12	<u><i>Avicennia marina (Forssk.) Vierh.</i></u>	သမဲ့ဖြူ	intermediate zones.	Rare
13	<u><i>Avicennia officinalis L.</i></u>	သမဲ့ကြီး	intermediate zones.	Abundant

Sr	Botanical name	Local Name	Zonation	Abundant, Rare or NIL
14	<u>Avicennia alba Blume</u>	သမဲ့ကြက်တက်	intermediate zones.	Rare
15	<u>Azima samentosa</u>	မိုးနှံ		Rare
16	<u>Barringtonia racemosa (L.) Spreng.</u>	ရေကျိုး		Rare
17	<u>Brownlowia tersa (L.) Kosterm</u>	ရေသမန်း	high frequency of tidal flooding	Abundant
18	<u>Bruguiera cylindrical (L) Bl.</u>	နှံဖြိုး	less frequent inundation	Rare
19	<u>Bruguiera gymnorhiza (L.) Lamk</u>	ဖြိုးအုပ်ဆောင်း	less frequent inundation	Abundant
20	<u>Bruguiera harnesii</u>		less frequent inundation	NIL
21	<u>Bruguiera parviflora (Roxb.) W. & A. ex Griff</u>	ဖြိုးဝါးကြိတ်လိန်	less frequent inundation	NIL
22	<u>Bruguiera sexangula (Lour.) Poir.</u>	ဖြိုးရွှေဝါ	less frequent inundation	Abundant
23	<u>Caesalpinia bonduc (L.) Roxb.</u>	ကျိုးကလိန်		Rare
24	<u>Caesalpinia crista L.</u>	အလိုလေး	high frequency of tidal flooding	Rare
25	<u>Calamus arborescens Griff.</u>	ဒန်း		Rare
26	<u>Calycopteris floribunda</u>	ကြက်နွယ်		Rare
27	<u>Calptrpis gigantea</u>	မရိုးကြီး		Rare
28	<u>Cerbera odollam Gaertn.</u>	ဇေတ်		Rare
29	<u>Ceryota urens</u>	မင်းဘော		Rare
30	<u>Ceriops decandra (Griff.) Ding Hou</u>	မဒမ	high frequency of tidal flooding	Rare
31	<u>Ceriops tagal (Perr.) C.B Robinson</u>	မဒမမျှော		Rare
32	<u>Clerodendrum inerme (L.) Gaertn</u>	တောင်ကြောင်ပန်း		Rare
33	<u>Combretum trifoliatum</u>	ဆောက်ပြာ		NIL
34	<u>Cordia cochinchinesis</u>	ရေသနတ်		Rare
35	<u>Crinium asiaticum L.</u>	ကိုရံကြီး		Rare

Sr	Botanical name	Local Name	Zonation	Abundant, Rare or NIL
36	<i>Cynometra ramiflora L.</i>	မြင်းက		Rare
37	<i>Dalbergia pinnata Lour.</i>	ရေမကြီးနွယ်		Abundant
38	<i>Dalbergia spinosa Roxb.</i>	ဆူးကုတ် (ခေါ်) မြိုက်ဆူး		Abundant
39	<i>Dalbergia volubilis Roxburgh</i>	ဒေါက်တလန်		NIL
40	<i>Dendrobium moschatum</i>	ဝါဆိုပန်း		Abundant
41	<i>Derris scandens (Aubl.) Pittier</i>	မိကျောင်းနွယ် (ခေါ်) နွယ်ဖြူ		Abundant
42	<i>Derris trifoliata Lour.</i>	နွယ်နက် (ခေါ်) ကဖြတ်နွယ်		Abundant
43	<i>Diospyros embryopteris</i>	တယ် (ခေါ်) ရေငန်ဘုတ်		Rare
44	<i>Diospyros ferrea</i>	မြင်းကနက် (ခေါ်) မဲပြောင်		Rare
45	<i>Diospyros maritime</i>	ဂြိုဟ်		NIL
46	<i>Dolichandrone spathacea (l.f.) K.Schum.</i>	သခွပ်		Rare
47	<i>Erythrina indica</i>	ပင်လယ်ကသစ်		Rare
48	<i>Eupatorium cannabinum L.</i>	ခွေးသေးပန်း		Rare
49	<i>Eupatorium odoratum L.</i>	ဗီးဇက်		Rare
50	<i>Excoecaria agallocha L.</i>	သရော	high frequency of tidal flooding	Abundant
51	<i>Finlaysonia maritime Backer ex k.lleyne</i>	မြောက်နွယ်		Abundant
52	<i>Ficus obtusifolia</i>	ညောင်လန်း		NIL
53	<i>Flagellaria indica L.</i>	မြောက်ကြိမ်		Rare
54	<i>Heritiera fomes Buch. Ham.</i>	ကနစို (ရွက်ကြီး)		Rare
55	<i>Heritiera littoralis Dryand.</i>	ကနစို (ရွက်သေး)		Rare
56	<i>Hibiscus tiliaceus L.</i>	သင်ဗန်း		Abundant
57	<i>Hygrophila obovata Wight</i>	မိကျောင်းကွမ်းဖတ်		Abundant
58	<i>Hygrophila spinosa T. Anders</i>	လယ်ပတူ		Abundant

Sr	Botanical name	Local Name	Zonation	Abundant, Rare or NIL
59	<u>Imperata cylindrica (L.) P. Beauv.</u>	သက်ကယ်		Abundant
60	<u>Intsia bijuga (Colebr.) Kuntze</u>	စကားလွန်း		Rare
61	<u>Ipomea biloba</u>	ပင်လယ်ကန်စွန်း		Abundant
62	<u>Ipomoea maxima (L.f) Don ex Sweet</u>	တောကန်စွန်း		Rare
63	<u>Ipomoea tuba (Schlecht.) G.Don.</u>	ဘုံစိန်နွယ်		Rare
64	<u>Kandelia candel (L.) Druce</u>	ဘိုင်တောင့်ရှည်		Rare
65	<u>Leptochloa filiformis (Lam.) P. Beauv</u>	မြက်ခါး		Abundant
66	<u>Lumnitzera littorea</u>	အိမ်မသွယ် (အနီ) (ခေါ်) ထားဝယ်မိုင်း	less frequent inundation	Nil
67	<u>Lumnitzera racemosa</u>	အိမ်မသွယ် (အဖြူ) (ခေါ်) ပျံရှား	less frequent inundation	Rare
68	<u>Merope angulata (Willd.) Swingle</u>	တောရှောက်		Rare
69	<u>Mucuna gigantean DC.</u>	ခွေးလေးနွယ်		Abundant
70	<u>Mussaenda macrophylla</u>	လဲလူ		Rare
71	<u>Nypa fruticans (Thumb.) Wurmb.</u>	ခနီ		Abundant
72	<u>Oncosperma filamentosa</u>	ကဇောင်း		Rare
73	<u>Pandanus foetidus Roxb.</u>	ဘဘော့		Rare
74	<u>Pandanus odoratissinus</u>	ဆက်သွားဖူး		NIL
75	<u>Phoenix paludosa Roxb.</u>	သင်ဘောင်း		Abundant
76	<u>Phragmites karka (Retz.) Trin. ex Steud.</u>	ကြဲ		Rare
77	<u>Pluchea indica (L.) Less.</u>	ခယူ		Rare
78	<u>Polygonum chinense</u>	ဘုတ်ထောင်		Abundant
79	<u>Pongamia pinnata (L.) Pierre</u>	သံသတ်		Rare
80	<u>Premna integrifolia Lam.</u>	တောတောင်တန်ကြီး		Rare

Sr	Botanical name	Local Name	Zonation	Abundant, Rare or NIL
81	<i>Rhizophora apiculata</i> BL.	မြူးခြေထောက် (အဖို)	high frequency of tidal flooding	Rare
82	<i>Rhizophora mucronata</i> Lamk.	မြူးခြေထောက် (အမ)	high frequency of tidal flooding	Rare
83	<i>Salacia prinoidies</i> DC. <i>S. chinensis</i> L.	ဘူ (ခေါ်) ဘွေသိမ်		NIL
84	<i>Sapium indicum</i>	နှာခေါင်းပူ		Rare
85	<i>Sarcolobus carinatus</i> Wall.	ဆွတ်ခမံနွယ်		NIL
86	<i>Sarcolobus globosus</i> Wall.	ရှပ်ထွေးနွယ်		Rare
87	<i>Sesuvium portulacastrum</i> (L.) L.	ဒရယ်လျာ		NIL
88	<i>Sonneratia alba</i> J. Smith	လမဲ့	intermediate zones.	Rare
89	<i>Sonneratia apetala</i> Buch. Ham.	ကန့်ပလာ	intermediate zones.	Rare
90	<i>Sonneratia caseolaris</i> (L.) Engl.	လမု	intermediate zones.	Rare
91	<i>Sonneratia griffithii</i> Kurz.	လဘ		Rare
92	<i>Stachytarpheta jamaicensis</i>	အဆိပ်တရာ		NIL
93	<i>Stenochlaena palustris</i> (Burm.) Bedd.	ဒမင်းနွယ်		Rare
94	<i>Thespesia populnea</i>	စွယ်တော် (ခေါ်) ဇေယျပနီ		NIL
95	<i>Vitis auriculata</i>	ယင်းနောင်းနွယ်		Rare
96	<i>Vitex ovata</i>	ကြောင်ပန်းကြီး		Rare
97	<i>Xylocarpus granatum</i> Konig	ပင်လယ်အုန်း	high frequency of tidal flooding	Rare
98	<i>Xylocarpus moluccensis</i> (Lamk) M. Roem.	ကျန		Rare

Attachment 5.

List of the name of community forests, Village Tract, Number of Community Forest User Group, location, permitted land area for CF, permitted date, local, International NGO, Facilitators.

Sr	Name of CF	Village Tract	Chairman of CF	CFUG Member	Compartment No.	Permitted CF area		CF Permitted Date	NGO
						Acre	Ha		
1	2 Bawa Thit	Bawa Thit	U Hla Naing	153	50,53,55	800	324	15-5-2017	RECOFTC
2	3 Bawa Thit	Bawa Thit	U Thein Han	58	55	400	162	15-5-2017	RECOFTC
3	3 Bawa Thit	Bawa Thit	U Tin Win	35	55,56	500	202	30-6-2018	FD
4	A She Pya	Bawa Thit	U Tin Yi	20	65	100	40	29-7-2013	BANCA
5	A She Pya	Bawa Thit	U Than Shwe	25	65	160	65	29--7-2013	BANCA
6	A She Pya	Bawa Thit	U Hla Myint	5	64, 65	265	107	14-2-2015	BANCA
7	Aung Kone	Bawa Thit	U Mg Gyi	27	52	169.6	69	10-10-2017	RECOFTC
8	East/ A She Ma Yan	Tebin Seik	U Kan Myint	32	56	47	19	15-5-2017	RECOFTC
9	Hpo/ Bo Ba Kone	Bo Ba Kone	U Tin Shein	60	46,47	807.24	327	15-5-2017	RECOFTC
10	Htan Pin Kone	Nauk Mee	U Hlaing Min Htun	35	60,61	183	74	10-11-2017	RECOFTC
11	Htan Pin Kone	Nauk Mee	U Khin Mg San	44	60,61	200	81	11-6-2020	FD
12	Kan Gyi Ba Aye Kone	Bawa Thit	U Hin Na Ri Hlaing	34	54	800	324	15-5-2017	RECOFTC
13	Kannar Kwin	Bawa Thit	U San Aye	45	53,62	415	168	10-11-2017	RECOFTC
14	Kanyin Kone(Island)	Bawa Thit	U Sein Mg	71	56	400	162	16-2-2001	FREDA
15	Kanyin Kone(Island)	Bawa Thit	U Lin Mg	27	56	356.72	144	24-10-2017	RECOFTC
16	Khar Chin	Seik Ma	U Khaing Win	20	57	7	3	16-2-2001	FREDA
17	Kwe tee	Seik Ma	U Kyaw Win	38	58	309	125	16-2-2001	FREDA
18	Kwe tee	Seik Ma	U Than Naing	34	58	344	139	10-11-2017	RECOFTC

Sr	Name of CF	Village Tract	Chairman of CF	CFUG Member	Compartment No.	Permitted CF area		CF Permitted Date	NGO
						Acre	Ha		
19	Lay Pin Chaung	Bawa Thit	U Htun Ni	22	52,53	110	45	15-5-2017	RECOFTC
20	Ma Hmwe Kwin	Seik Ma	U Myint Kyi	30	59	237	96	16-2-2001	FREDA
21	Ma Hmwe Kwin	Seik Ma	U Thaw Tar Htun	58	59	251	102	10-11-2017	RECOFTC
22	Nga Tan Se	Seik Ma	U Kyaw Win Aung	39	59,61	218	88	10-11-2017,	RECOFTC
23	Oakpo Kwin Chaung	Tebin Seik	U Tin myint	33	49	175	71	16-2-2001	FREDA
24	Oakpo Kwin Chaung	Tebin Seik	U San Oo Hlaing	28	31,32,48,49	282	114	24-10-2017	RECOFTC
25	Padauk Pin Seik	Bawa Thit	U Thein Shwe	0	55, 61, 62	742	300	15-5-2017	RECOFTC
26	Phoe Htoo Taung Yar	Bo Ba Kone	U Ngwe Thein Kyaw	42	47	365.16	148	10-10-2017,	RECOFTC
27	Taw Tuk	Bo Ba Kone	U Than Hteik Aung	15	47,48	134.38	54	10-10-2017,	RECOFTC
28	Tebin Seik	Tebin Seik	U Tin San	18	56	150	61	16-2-2001	FREDA
29	Tha Main Pa Le	Bawa Thit	U Myint Win	6	64	218.8	89	14-2-2015	BANCA
30	Tha Main Pa Le	Bawa Thit	U Khin Soe	6	65	200.4	81	14-2-2015	BANCA
31	Tha Main Pa Le	Bawa Thit	U Khin Chaw	6	64	149.8	61	14-2-2015	BANCA
32	Tha Main Pa Le	Bawa Thit	U Khin Mg Nyo	124	63	1321	535	15-5-2017	RECOFTC
33	U Pe	Nauk Mee	U Kyaw Khaing	6	62, 63	358	145	14-2-2015	BANCA
34	U Pe	Nauk Mee	U Min Thein	49	61	810	328	15-5-2017	RECOFTC
35	Wa Kone	Tebin Seik	U Tin Aung	45	56	250	101	16-2-2001	FREDA
36	Wa Kone	Tebin Seik	U Soe Than	20	56	100	40	15-5-2017	RECOFTC
37	Wapana	Nauk Mee	U Myint Kyaw	57	62	1078	436	10-10-2017,	RECOFTC
38	West/ Anauk Ma Yan	Tebin Seik	U Myint Zaw	68	49,50,55,56	543	220	24-10-2017	RECOFTC
39	Kadat Kwin								
40	Kyauk Taing								
41	Nout Pyan Toe								

Attachment 6.

Record Photos for Field Work

3. Ba Wa Thit Community Forest



2. Ba Wa Thit Community Forest



Oak Pho Community Forest



Wa Kone Community Forest



NTEP



**Seed Production from Seed Production Area of
Lay Pin Chaung Community Forest**



Evaluation team members U Mya Win, U Soe Min, Project Manager U Kyaw Soe Htun discussed to do the questionnaire survey at 28 village, to find the “Relevance, Effectiveness, Efficiency and Sustainability of the project. Date 12th June, 2024 at Oakpho FREDA camp.



Evaluation team member U Soe Min, U Mya Win, U Hla Thein (Chairman of Warkone CF, and U Win Win from 3 Ba Wa Thit First discussion with U Win Win and U Hla Thein, chairman of Warkone CF, Date 13th June, 2024 at U Win Win's house



Evaluation team observed the water course buffer protection along the stream in Pyindaye reserved forest on 15th June, 2024. It was seen that the mangrove trees are protecting river bank erosion.



Second Discussion with U Hla Thein, chairman of Warkone Community forest Management Activities such as felling cum regeneration, harvesting and replanting at CF, Date 16-6-2024 at U Hla Thein House



Seedling production for mangrove plantation of Warkone CF



Warkone community forest, located at compartment (56) of Pyindaye reserved forest, managed by (64) community forest user group. 2001 plantation(100) acre, natural forest (150) acre, 2017 plantation (30) acre, gap planting (70) acre, in total (350)acre, seen at 16th June, 2024.



A community forest user group member of Warkone community forest, who is protecting his community forest from illegal fuelwood cutting, Date 16 June, 2024



Mixed mangrove plantation to promote biodiversity by replacing monoculture with polyculture, Date 16th June, 2024 at 2 Ba Wa Thit Community Forest, Pyindaye reserved forest



Listening to the voice of poor family, who want to do rice cultivation at Pyindaye reserved forest, for the education of two children, disabled husband on 21st September, 2024 This family planted mangrove plantation at the gap with the financial support of GEDA



**Ground truth Observation at land use change area on 21st September, 2024
Expansion of rice field, however, the mangrove plant species along the watercourse
buffer remain Date 21st September, 2024 at Taw Tuk community forest**



**Listening to the Success story of West Ma Yan Community Forest on
21st September, 2024 at U Khin Zaw Oo's house, Te Pin Seik village**



**Group discussion at Oak Pho Kwin Chaung Community Forest Chairman's house
on 8:00 am to 11:00 am 22nd September, 2024**



**Listening to the Community Voice of U Sann Oo Hlaing, chairman of Oak Pho
Community Forest 10:00 am to 12:00 noon, 22nd September, 2024,
Oak Pho FREDa camp**



**Focus Group Discussion at 2Ba Wa Thit village Evaluation team member,
Range Officer of Forest Department and community forest user group members
from 2 Ba Wa Thit village on 22nd September, 2024**



**Debriefing, reporting Ground truth observation, evaluation finding, reviewing and
discussing on issues and threats found in community forest, to U Kyaw Zan Shwe,
the staff officer of Pyarpon township forest department on 23rd September,
2024 at Pyarpon township forest department, Evaluation team member U Mya Win,
U Soun Htwe, and U Kyaw Zan Shwe, the staff officer of Pyarpon township forest
department**



Attachment 7 : List of typical and associate mangrove species in Myanmar

No.	Species	Family	Type of plant	Water salinity	Myanmar name	Local name (Rakhine)	Local name (Tanintharyi)
1	<i>Acanthus ilicifolius</i> L.	Acanthaceae	S	F/B/S	Suu kaya	Phat yan suu	Cha suu
2	<i>Acanthus volubilis</i> Wall.	Acanthaceae	S	B/S	Kaya nwe	Nimbi	Zar lain
3	<i>Acrostichum aureum</i> L.	Pteridiaceae	F	F/B	Hngat gyi daung (Aywet gyi)	Mo han	Za loke ngauk
4	<i>Acrostichum speciosum</i>	Pteridiaceae	F	F/B	Hngat gyi daung (Aywet thay)		
5	<i>Aegialitis rotundifolia</i> Roxburgh.	Plumbaginaceae	S	B/S	Pin le sha	Sar baung pin	Pa dan
6	<i>Aegiceras corniculatum</i> (L.) Blanco	Myrsinaceae	T	F/B/S	Ye Kaya	Kyet tha lone	Yet sa kone
7	<i>Amoora cucullata</i> (Roxb.)	Meliaceae	T	F/B	Pan ta ga		
8	<i>Anamirta paniculata</i> Colebr.	Menispermaceae	C	F/B	Kyee thay or Kyi lay nwe		Za li paung
9	<i>Ardisia litoralis</i>	Myrsinaceae	S	F/B	Shar two kyat mount		
10	<i>Avicennia lanata</i> Ridley	Avicenniaceae	T	S			Me pan
11	<i>Avicennia marina</i> (Forsk.) Vierh.	Avicenniaceae	T	B/S	Tha me Phyu	Pyar phyu	
12	<i>Avicennia officinalis</i> L.	Avicenniaceae	T	B/S	Tha me gyi	Pyar me	
13	<i>Avicennia alba</i> Blume	Avicenniaceae	T	B	Tha me Kyet tet	Pyar thain	Lame
14	<i>Azima sarmentosa</i>	Salvadoraceae	T/S	B/S	Moe nan		
15	<i>Barringtonia racemosa</i> (L.) S preng. Syn. <i>Bacutangula</i>	Myrtaceae	T	F	Ye kyi		
16	<i>Brownlowia tersa</i> L.	Tiliaceae	S	B/S	Ye tha man	Cho tha lin	
17	<i>Bruguiera cylindrica</i> (L.) Bl.	Rhizophoraceae	T	B/S	Nan Byu	Nan phyu	Byu poke
18	<i>Bruguiera gymnorhiza</i> (L.) Lamk.	Rhizophoraceae	T	B/S	Byu oak saung	Toke	Saung gyi
19	<i>Bruguiera parviflora</i> Wight and Arnold ex Griffith	Rhizophoraceae	T	B/S	Byu-wa kyeik lein	Thila	Hngat

No.	Species	Family	Type of plant	Water salinity	Myanmar name	Local name (Rakine)	Local name (Tanintharyi)
20	<i>Bruguiera sexangula</i> (Lour.)Poir.	Rhizophoraceae	T	B	Byu shwe wa	Mauk kayo	Saung thay
21	<i>Caesalpinia bonduc</i> (L.) Roxb.	Leguminosae	C	B/S	Kyee ka lain		
22	<i>Caesalpinia crista</i> L.	Leguminosae	C	B/S	A lo lay	Myauk do nwe	Baitama Suu
23	<i>Calamus arborescens</i> Griff.	Palmae	P	F/B	Da non		
24	<i>Calycopteris floribunda</i>	Combretaceae	C	F/B	Kywet nwe		
25	<i>Calptropis gigantea</i>	Asclepiadaceae	H/S	F/B	Ma yo gyi		
26	<i>Cerbera odollam</i> Gaertner	Apocynaceae	S	F	Sa lat		Ka hlwa
27	<i>Ceryota urens</i>	Palmae	T	F	Min baw		
28	<i>Cerriops decandra</i> (Griff.)Ding Hou	Rhizophoraceae	T	B	Ma da ma	Ka baing	
29	<i>Cerriops tagal</i> (Perr.) C. B. Robinson	Rhizophoraceae	T	B/S	Ma da ma myaw		Pan lone
30	<i>Clerodendron inerme</i> (L.)Gaertn	Verbenaceae	C	F/S	Taw kyaung pan		Tha man zay yar
31	<i>Combretum trifoliatum</i>	Combretaceae	T	F/B	Sauk pya		
32	<i>Cordia cochinchinesis</i>	Boraginaceae	T	B/F	Ye tha nat		
33	<i>Crinum asiaticum</i> L.	Amaryllidaceae	H	B/F	Ko yan gyi		
34	<i>Cynometra ramiflora</i> L.	Leguminosae	T	F/B	Myin ga		
35	<i>Dalbergia pinnata</i> Lour.	Leguminosae	C	B/S	Ye ma gyi nwe		
36	<i>Dalbergia spinosa</i> Roxb.	Leguminosae	C	B/S	Suu koke or Byaik Suu	Sar lein	Dauk te suu
37	<i>Dalbergia volubilis</i>	Leguminosae	S	B/S	Dauk talan		
38	<i>Dendrobium moschatum</i>	Ochidaceae	H	F/B	Wa so pan		
39	<i>Derris scandens</i> (Roxb.) Benth.	Papilionaceae	C	F/B	Mi gyaung nwe or Nwe phyu		Taw pon nwe
40	<i>Derris trifoliata</i> Lour.	Papilionaceae	C	B/S	Nwe net or Ka byoke nwe	Nwe poke	Ye nar nut

No.	Species	Family	Type of plant	Water salinity	Myanmar name	Local name (Rakine)	Local name (Tanintharyi)
41	<i>Diospyros embryopteris</i>	Ebenaceae	T	F/B	Te or Ye-ngan-boak		Boak
42	<i>Diospyros ferrea</i>	Ebenaceae	T	F/B	Myin ka net or Me pyaung		
43	<i>Diospyros maritima</i>	Ebenaceae	T	F/B	Gyoke		
44	<i>Dolichandrone spathacea</i> (L.f.) K.Schumann	Bignoniaceae	T	B/F	Tha kyut		
45	<i>Erythrina indica</i>	Leguminosae	T	F/B	Pyin-le-ka-thit		
46	<i>Eupatorium odoratum</i> L.E.conyzoidesVAHL	Compositae	H	F	Bee sat		
47	<i>Excoecaria agallocha</i> L.	Euphorbiaceae	T	F/B	Tha yaw	Kyi gan	Tha yaw
48	<i>Finlaysonia maritima</i> Backer ex k.lleyne	Asclepiadaceae	C	B/S	Byauk nwe	Ma ni tut kay	Set ku nwe
49	<i>Ficus obtusifolia</i>	Moraceae	T	F/B	Nyaung lan		
50	<i>Flagellaria indica</i> L.	Flagellariaceae	C	F/S	Myauk kyein	Myauk kyein	Kyaung fet
51	<i>Heritiera fomes</i> Buch.Ham.	Sterculiaceae	T	F/B	Kanazo (Ywet gyi)	Ye zoe	Kanazo
52	<i>Heritiera littoralis</i> Dryand. in Aiton	Sterculiaceae	T	F/B	Kanazo (Ywet thay)		
53	<i>Hibiscus tiliaceus</i> L.	Malvaceae	S	F/B	Thin ban	Thin ban shaw	Ye ngan shaw
54	<i>Hygrophila obovata</i>	Acanthaceae	S	B/S	Michaung kon fust		
55	<i>Hygrophila spinosa</i>	Acanthaceae	H	F/B	Le pa du		
56	<i>Imperata cylindrica</i> (L.) Beauv.	Gramineae	G	F	Thet ke		
57	<i>Intsia bijuga</i> (Colebr.) O.Kuntze	Leguminosae	T	F/S	Sa ka lun		
58	<i>Ipomoea biloba</i>	Convolvulaceae	C	S	Pinle kazon		
59	<i>Ipomoea maxima</i>	Convolvulaceae	C	F/B	Taw kazon		
60	<i>Ipomoea tuba</i> (Schlecht.) G.Don.	Convolvulaceae	C	F/B	Bon sein nwe		
61	<i>Kandelia candel</i> (L.)Druce	Rhizophoraceae	T	B	Baing daung she	Taung pun thi (Pyar tha lin)	Mimalaung or Byu-kauk-nyin
62	<i>Leptochloa filiformis</i> (Lam.)	Gramineae	G	B/S	Myet khar		

No.	Species	Family	Type of plant	Water salinity	Myanmar name	Local name (Rakhine)	Local name (Tanintharyi)
63	<i>Lumnitzera littorea</i>	Combretaceae	T	B/S	Aeik ma thwe (Ani) or Hta wai mine		
64	<i>Lumnitzera racemosa</i>	Combretaceae	T	B/S	Aeik ma thwe (Aphyu) or Pyanshar		
65	<i>Merope angulata</i> (Willd.) Swingle	Rutaceae	S	F/B	Taw shauk		
66	<i>Mucuna gigantea</i> DC.	Leguminosae	C	F/B	Khwe lay nwe		
67	<i>Mussaenda macrophylla</i>	Rubiaceae	H	F/B	Lelu		
68	<i>Nipa fruticans</i> (Thunb.) Wurmb.	Palmae	P	F/B	Dani	Ohn	
69	<i>Oncosperma filamentosa</i>	Palmae	P	B/S	Kazaung		
70	<i>Pandanus foetidus</i> Roxb.	Pandanaceae	P	F/S	Thabaw		
71	<i>Pandanus odoratissimus</i>	Pandanaceae	P	F/S	Sut thwart phu		
72	<i>Phoenix paludosa</i> Roxb.	Palmae	P	F/B	Thin baung		Lue pin
73	<i>Phragmites karka</i> Roxb.	Gramineae	G	F	Kyu		
74	<i>Pluchea indica</i> Less.	Compositae	S	F/B	Kayu		Chu
75	<i>Polygonum chinense</i>	Polygonaceae	H	F/B	Boak htaung		
76	<i>Pongamia pinnata</i> (L.) Pierre	Leguminosae	T	F/B	Than thut		
77	<i>Premna integrifolia</i> Lam.	Verbenaceae	C	F/B	Taw taung dan gyi		
78	<i>Rhizophora apiculata</i> BL.	Rhizophoraceae	T	B	Byu chi dauk (Apo)		Payon (Aphyu)
79	<i>Rhizophora mucronata</i> Lamk.	Rhizophoraceae	T	B/S	Byu chi dauk (Ama)		Payon (Ame)
80	<i>Salacia prinioides</i> DC. <i>S.chinensis</i> L.	Hippocrateaceae	C	F/B	Bu or Thwe thain		Minka
81	<i>Sapium indicum</i>	Euphorbiaceae	T	F	Na khaung pu		Padar
82	<i>Sarcolobus carinatus</i>	Asclepiadaceae	C	F/B	Swut kamon nwe		
83	<i>Sarcolobus globosus</i> Wall.	Asclepiadaceae	C	F/B	Shoke htwe nwe		Samon nwe
84	<i>Sonneratia alba</i> J. Smith	Sonneratiaceae	T	S	Lame	Labai	Lanbe

No.	Species	Family	Type of plant	Water salinity	Myanmar name	Local name (Rakine)	Local name (Tanintharyi)
85	<i>Sonneratia apetala</i> Buch.Ham.	Sonneratiaceae	T	B/S	Kanbala	Pyar Zi	A ma yar
86	<i>Sonneratia caseolaris</i> (L.)Engler (Syn.S.acida)	Sonneratiaceae	T	F/S	Lamu		
87	<i>Sonneratia griffithii</i> Kurz	Sonneratiaceae	T	B	Laba		Lanbe
88	<i>Stachytarpheta jamaicensis</i>	Verbenaceae	S	B/S	Ah seik ta yar		
89	<i>Stenochlaena palustris</i> (Burm.) Bedd.	Polypodiaceae	C	B	Da min nwe		
90	<i>Thespesia populnea</i>	Malvaceae	T	F/B	Swedaw or Zamupani		
91	<i>Vitis auriculata</i>	Vitaceae	C	F/B	Yinnaung nwe		
92	<i>Vitex ovata</i>	Verbenaceae	S	F/B	Kyaung pan gyi		
93	<i>Xylocarpus granatum</i> Konig	Meliaceae	T	B	Pinle-on	Ye ohn	
94	<i>Xylocarpus moluccensis</i> (Lamk.) Roem.	Meliaceae	T	B	Kyana	Pa nan	Kyath nan

- Source:
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Attachment 8.

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Location of the “Mangrove Ecosystems Restoration and Community Development Project”